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# IMPROVING HANDWASHING AND FOOD HYGIENE BEHAVIORS FOR INFANT AND YOUNG CHILD FEEDING IN RURAL MALAWI

## FORMATIVE RESEARCH REPORT

Report prepared by FHI 360.

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# TABLE OF CONTENTS

# LIST OF TABLES

# LIST OF FIGURES

# ACRONYMS

| | |
|---|---|
| BCC | Behavior Change Communication |
| DIY | Do-It-Yourself |
| CLTS | Community-Led Total Sanitation |
| FGD | Focus Group Discussion |
| FH | Food Hygiene |
| HACCP | Hazard Analysis and Critical Control Points |
| HCD | Human-Centered Design |
| HW | Handwashing |
| IDI | In-Depth Interview |
| IYC | Infant and Young Child/Children |
| NGO | Nongovernmental Organization |
| SBC | Social and Behavioral Change |
| TAs | Traditional Authorities |
| TIPs | Trial of Improved Practices |
| USAID | United States Agency for International Development |
| VSLA | Village Savings and Loan Association |
| WASH | Water, Sanitation, and Hygiene |
| WASHPaLS | Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability |
| WaterSPOUTT | Water Sustainable Point of use Treatment Technologies |

# EXECUTIVE SUMMARY

## BACKGROUND AND OBJECTIVES

Hands are central to the fecal-oral contamination pathway, transmitting pathogens from contaminated environments to the mouth through hand contact and the feeding of contaminated foods. Pathogen consumption from contaminated food causes significant health problems, especially in low-income settings, and children are especially vulnerable when they start consuming complementary foods, around six months of age. This United States Agency for International Development (USAID) Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability (WASHPaLS) #2 study focused on handwashing (HW) and food hygiene (FH) during complementary feeding, an under-researched area critical to infant and young child (IYC) health, with little existing evidence on effective interventions.

The formative research study aimed to identify an acceptable, feasible, and desirable intervention package to support caregivers' improved performance of HW and FH behaviors concerning preparation and feeding of complementary foods for IYC. The study had two objectives:

> **Objective 1** was to validate the points in food preparation and consumption that are critical to reducing the consumption of pathogens both directly and indirectly by IYC.

> **Objective 2** aimed to use co-design methods to identify and field test acceptable, feasible, and desirable HW and FH hardware products and behavior change communication (BCC) approaches to address the critical control points identified under the first objective to support HW and FH behaviors by caregivers.

## METHODOLOGY

WASHPaLS #2 implemented this mixed-methods study from November 2023 through April 2024 in Mpama and Onga traditional authorities (TAs) in Chiradzulu, Malawi. The WASHPaLS #2 team validated critical control points using the internationally recognized Hazard Analysis and Critical Control Points (HACCP) assessment method, which identifies hazards and risks associated with complementary feeding practices, and enables the subsequent identification of effective control practices at critical points—i.e., ways to reduce the risks of a hazard occurring (Motarjemi and Warren 2023). To accomplish Objective 2, the team first utilized human-centered design (HCD) approaches to identify locally available enabling hardware products that could facilitate hygienic practices, namely drying racks, HW devices, feeding mats, feeding utensils (i.e., spoons, plates, cups), and food covers (i.e., storage containers, pot covers/lids). The team then conducted a field test using a trial of improved practices (TIPs) approach to understand impressions and use of the intervention among caregivers in households with infants and young children. This approach ensured tailoring the intervention to local critical control points, and refining HW and FH hardware and BCC messaging.

## FINDINGS

Findings confirmed the following as critical control points in the food preparation and feeding process: HW with soap before and during food preparation and IYC feeding, (re)heating and cooling of food, use of clean cookware and utensils for food preparation and child feeding, feeding of IYC, and storage of foodstuffs. Despite high awareness of cholera and other diarrheal diseases, in-depth interviews (IDIs) and observations revealed HW during complementary food preparation and feeding comprised rinsing hands with water only. Ownership and use of enabling hardware were very limited; HW stations were present in only 41.1 percent of caregiver households, and soap was available in only 3.6 percent of all households. Similarly, only 23.2 percent of households owned dish drying racks, and 37.5 percent owned

feeding mats. Despite these limitations, family members and neighbors viewed the hygienic practices themselves, though infrequently practiced, acceptable and encouraged their use, according to IDI and focus group discussion (FGD) participants.

Using TIPs, the team tested two hardware packages ("aspirational" and "traditional") with the potential to improve hygienic practices at the critical control points. The team selected locally available products as these would have the highest potential for use by households based on their perceived desirability and/or feasibility of obtaining and using them regularly. The table below lists the products according to primary use and potential hazard or control point addressed; some products, however, could serve multiple purposes. For example, households could use the bucket with tap and soap products for cleaning utensils and use the racks and shelves for storing foodstuffs or leftover meals. The "aspirational package" included products seen as most desirable—especially in terms of durability and quality—but more expensive than most could afford, while the "traditional package" included products seen as widely available and affordable, but less desirable for HW and FH practices related to feeding IYC (see Table i).

**Table i. Aspirational and traditional products included in intervention**

(Products in bold are those identified as highest potential as a result of this study, in terms of their uptake during TIPs, qualitative feedback, and cost of purchase/construction.)

| | **Aspirational Arm** | **Traditional Arm** |
|---|---|---|
| **Hand hygiene during food preparation and IYC feeding** | **Bucket with tap** | Leaky tin |
| | Leaky tin | Bucket with tap |
| | **Bar soap** | |
| | **Soapy water bottle** | |
| **Cooking and feeding utensil storage and hygiene** | **Wire rack** | Bamboo rack |
| | | **Indoor shelf** |
| **Child feeding location and utensils** | Woven plastic mat | **Bamboo mat** |
| | | **Maize sack topper** |
| | **Plastic spoon, plates, cup** | |
| **Leftover food storage** | **Plastic food storage container** | |
| **BCC** | Food safety poster | |
| | Owner's manual | |

Based on the TIPs, caregivers expressed clear preferences for certain HW and FH products for use at specific stages in the child's safe-feeding journey. Caregivers favored and utilized bucket with tap HW stations more than leaky tins, especially for HW before feeding IYC. Caregivers also indicated some hesitancy to using the leaky tin for household cooking and feeding purposes, as most participants in the study considered the leaky tin as a handwashing device for washing hands following latrine use; they preferred the bucket with a tap for household cooking and feeding use. Caregivers who received two-tier wire racks were more inclined to use them compared to those using traditional bamboo racks. There was no distinct preference for feeding mats, with both split bamboo and imported plastic mats widely used. Similarly, caregivers employed the feeding kit widely. Soap usage for washing hands and utensils remained low, in part because the soap provided quickly ran out, and due to its strong smell—which was a deterrent to using it for washing utensils. There were also improvements in hygienic practices related to covering foods as they cooled, which was promoted in the BCC materials but did

not have a dedicated hardware item, since no desirable or feasible dedicated product could be sourced locally, and people were found to use items for covering that they already had in the household.

Caregivers identified remembering to perform the hygienic practice or it becoming a habit as a crucial factor in using the provided products to support recommended HW and FH behaviors. Additionally, awareness of the benefits of the hygienic practice, personal commitment to performing the hygienic practices, the availability and convenient placement of hardware such as soap, HW stations, and dish drying racks facilitated their utilization.

## IMPLICATIONS FOR FOLLOW-ON RESEARCH

Potential follow-on studies can build on the key findings from this formative research to generate additional evidence that may inform scale-up of including enabling hardware for HW and FH into broader water, sanitation, and hygiene (WASH) and nutrition programming. Overall, the findings suggest that the introduction of hardware (e.g., HW stations and FH hardware) and choice architecture within the home environment can minimize the need for more resource-intensive BCC. This hypothesis could be tested in an efficacy study to examine the impacts of minimal versus more intensive BCC alongside the introduction of hardware.

Furthermore, while the exploratory study found that households accepted both aspirational and traditional items and these items appeared to facilitate behavior change, further evidence is necessary to demonstrate effective and feasible interventions to deliver these enabling products within the study context, as well as applicability of these findings to additional contexts beyond Chiradzulu, Malawi. Further exploration is also needed to identify optimal, yet cost-effective, BCC strategies that account for key determinants of HW behaviors prior to food preparation and feeding, which appear to be different than the determinants that drive HW behaviors following latrine use.

As a follow-up to the research presented in this report, WASHPaLS #2 recommends testing the efficacy of the HW and FH package identified, focusing on the hardware products bolded in Table i. Designed to further discern the impact of different BCC intensities, the follow-on study would address these research questions:

- What is the effect of the HW and FH hardware and relative role of BCC messaging within the broader intervention package, on caregivers' performance of HW and FH behaviors around complementary food preparation and consumption by IYC?

- What is the effect of the HW and FH hardware and relative role of BCC messaging within the broader intervention package, on reported diarrhea incidence among IYC?

# 1.0   INTRODUCTION

The United States Agency for International Development (USAID) Water, Sanitation, and Hygiene Partnerships and Learning for Sustainability (WASHPaLS) #2 project seeks to explore social and behavioral change (SBC) approaches to improve hygienic environments, handwashing (HW), and food hygiene (FH) behaviors, particularly as relates to infant and young children (IYC). Hands are central to the fecal-oral contamination pathway, transmitting pathogens from contaminated environments to the mouth through hand contact and the feeding of contaminated foods. Pathogen consumption from contaminated food causes significant health problems, especially in low-income settings, and children are especially vulnerable when they start consuming complementary foods, around six months of age. Inadequate hand and food hygiene lead to health issues such as diarrheal diseases, dysentery, typhoid, worm infections, and polio.

Efforts to improve hygienic environments largely aim to reduce the fecal load present on hands, in food, and in water by creating a cleaner general environment, while efforts to improve HW and FH practices aim to break transmission pathways linked directly to the body. WASHPaLS #2 carried out a study in Southern Malawi that focuses on HW and FH in relation to preparation and feeding of complementary foods. Complementary foods and feeding refer to the introduction of semi-solid and solid foodstuffs around six months of age to complement breastfeeding (which is recommended to continue until a child reaches 24 months of age). Conceptualization of the original research was as a two-phase study to generate evidence on the effects of introducing hardware and altering choice architecture within the home environment using aspirational HW stations and FH hardware, as environmental interventions can minimize the need for more resource-intensive behavior change communication (BCC) approaches. While envisioning a second phase, the design of the first phase was a standalone formative research study, conducted in partnership with the World Vision Water, Sanitation, and Hygiene (WASH) for Everyone project, which was implementing a community-led total sanitation (CLTS) intervention in Chiradzulu district in Southern Malawi until September 2024.[1] The study design, inception, and implementation were completed using a robust stakeholder engagement approach based on full and equitable collaboration between implementing partner and Malawian co-investigators (USAID WASHPaLS #2 Project 2023b).

This report details the methods and results of this first phase formative research study. A full literature review which contributed to development of the research questions is also available (USAID WASHPaLS #2 Project 2023b).

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[1] In partnership with the London School of Hygiene and Tropical Medicine (LSHTM), WASH for Everyone has conducted a randomized before-and-after trial with a control as part of an evaluation of their CLTS intervention package. This WASHPaLS #2 study was conducted in areas of Chiradzulu not selected as sites for the LSHTM study.

## 2.0   STUDY OBJECTIVES

The formative research aimed to identify an acceptable, feasible, and desirable intervention package to support caregivers' improved performance of HW and FH behaviors in connection to preparation and feeding of complementary foods for infants and young children (IYC). The study had two objectives.

The first objective was to validate the Hazard Analysis and Critical Control Points (HACCP) of preparation and feeding of complementary foods based on findings from a HACCP conducted in Chikwawa in 2017 (Chidziwisano et al. 2019). Validation in the context of this study meant confirmation of the validity/applicability of the evidence to this study's context. The team assessed all steps related to food preparation, cooling, feeding, storage, and reheating (i.e., critical control points). These included activities directly (e.g., washing ingredients) or indirectly related to food (e.g., washing hands with soap before food feeding). Validation of previous evidence was crucial to account for contextual and cultural differences in co-designing the intervention package. Validation of the known critical control points was essential to capture and address any changes in food preparation behaviors resulting from the impact of Cyclone Freddie (2023), which severely affected access to water and sanitation and stressed many aspects of subsistence, including food security.

The second objective aimed to use co-design methods to identify and test an acceptable, feasible, and desirable set of HW and FH hardware products and BCC approaches to address the critical control points identified under the first objective to support HW and FH behaviors by caregivers.

# 3.0 METHODOLOGY

## 3.1 STUDY DESIGN

The WASHPaLS #2 team conducted this mixed-methods study in Mpama and Onga traditional authorities (TAs) of Chiradzulu district, Malawi. Data collection was implemented in three complementary and sequential steps (Figure 1) from November 2023 through April 2024 by a contracted local data collection firm, KLAS Research Engine.

Focus Group Discussions (FGDs), in-depth interviews (IDIs), and observations addressed the first objective of validating the HACCP (Step 1), while FGDs with product fairs and community workshops (Step 2) and a trial of improved practices (TIPs; Step 3) addressed the second objective of co-designing and testing the feasible and acceptable intervention package. This sequential design allowed us to tailor the intervention to locally relevant critical control points and refine it gradually to identify a combination of FH and HW hardware and BCC messaging.

The study was approved by the FHI 360's Office of International Research Ethics and the National Committee on Research in the Social Sciences & Humanities in Malawi.

Objective 1

**Step 1**
Validating HACCP
- FGDs with video vignettes
- IDIs and household observations

Objective 2

**Step 2**
Co-designing intervention
- FGDs with product fairs
- Community workshops

**Step 3**
Field testing co-designed intervention
- Trial of improved practice
- Structured qualitative interviews
- Surveys
- Observations
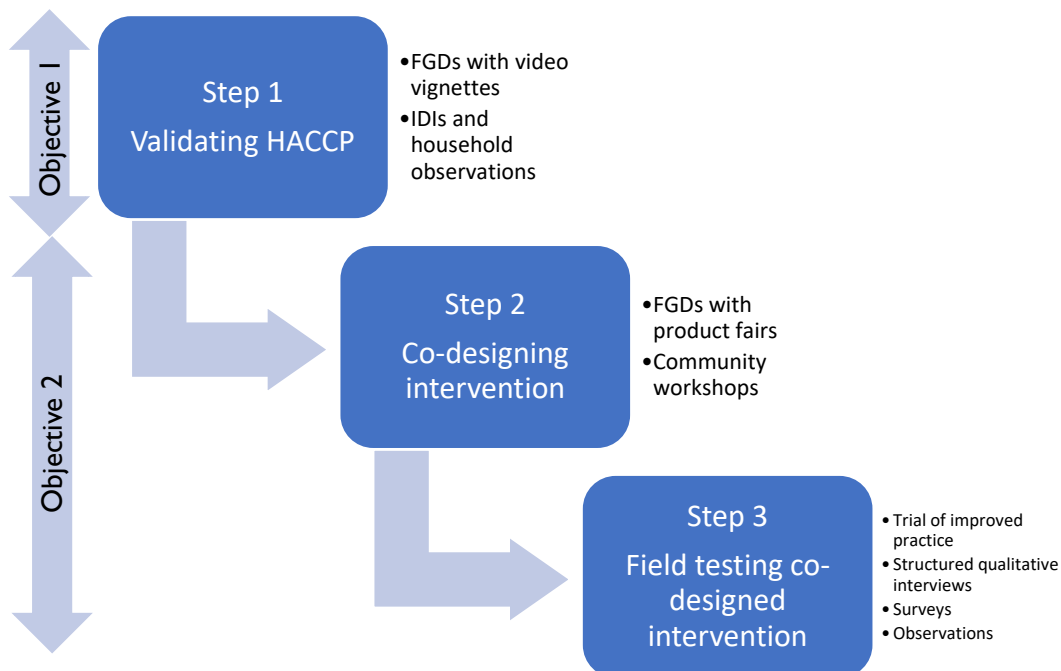
**Figure 1. Data collection methods for Steps 1–3**

## 3.2 STUDY SETTING

Chiradzulu District is in southern Malawi (Figure 2), approximately 15 miles from the commercial city of Blantyre. The district encompasses 10 subdistricts called traditional authorities (TAs) comprising 831 villages with a total population of 356,875 (National Statistical Office of Malawi 2018). Most residents are subsistence farmers who live on less than US$0.50 per day. Overall, the district has adequate rainfall and hydrogeological characteristics to support universal water access. As noted previously, Cyclone Freddy impacted Chiradzulu in 2023, a devastating storm that displaced nearly 200,000 people in southern Malawi (NPR 2023). International nongovernmental organizations (NGOs) have been operating in the area to restore damaged infrastructure, including reconstructing latrines and providing safe drinking water as observed during the study team's scoping visit conducted in June of 2023. Since 2022, World Vision Malawi, in partnership with local and regional officials, has been implementing the WASH for Everyone project, which aims to reach universal sanitation coverage by the end of 2024. Health surveillance assistants (HSAs), a paid cadre of community-based health workers employed by the government, reside and work in the area and provide and promote a variety of services, including hygiene and sanitation, vaccination, maternal and child health and nutrition, and family planning (Ntopi, Chirwa, and Maluwa 2020).
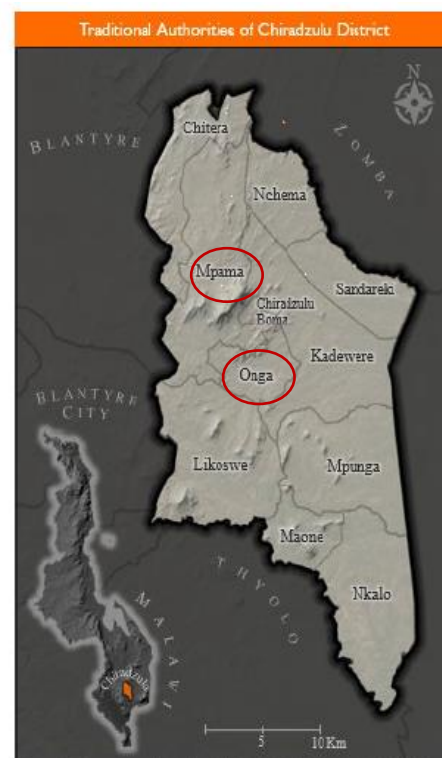


**Figure 2. Map of Malawi showing location of Chiradzulu District and district outline with TAs.**

WASHPaLS #2 selected Mpama and Onga TAs in collaboration with the implementing partner, World Vision, because they were planned intervention sites for the WASH for Everyone project in Fiscal Year 2024 and were not selected as part of their ongoing CLTS-focused randomized before-and-after trial being carried out by the London School of Hygiene and Tropical Medicine (LSHTM).

## 3.3 STUDY PARTICIPANTS

Across all data collection methods, the study involved both caregivers and household influencers[2] of IYC ages 6–23 months. IYC in this age group present the highest risk of exposure to food contamination and the highest risk of diarrhea. For the purposes of this study, the team defined caregiver as the main household member who directly attends to, feeds, or prepares food for IYC ages 6–23 months. The team purposefully selected caregivers from households with IYC. All caregivers were at least 18 years old, lived in the same household as the IYC, and were the biological parent of the IYC. The study excluded caregivers of children who were still exclusively breastfed, those who declined to give consent, and those who declined to be audio recorded (for FGDs). For the TIPs component, an additional requirement was the informed consent of the head of household.

The definition of household influencers was any family member (e.g., head of household, mother-in-law) or community member (e.g., religious leaders, neighbors) who made decisions regarding food purchase, preparation, and feeding in a household with a child aged 6–23 months and/or more generally influenced

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[2]    Collecting data from household influencers alongside caregivers is generally best practice in SBC research and intervention design.

how caregivers "spent their time" and "cared for children." Influencers may or may not have been living with the caregiver and IYC. Interviewers worked with caregivers to identify the most influential person who met this description and the inclusion criteria—at least 18 years old and living in the same general area as the caregiver identifying them (i.e., no national celebrities). The survey excluded influencers if they declined to give consent or be recorded.

## 3.4 DATA COLLECTION SUMMARY

Table 1 summarizes the methods, target audience, sample size, and outcomes for each step.

**Table 1. Data collection methods, participant group, target sample size, and outcomes per step**

| Study Objectives | Steps | Data Collection Method | Participant Group and Target Sample Size | Anticipated Outcomes |
|---|---|---|---|---|
| Objective 1 | Step 1: Validate HACCP | FGD using video vignette | 4 FGDs (2 per TA) with 8 IYC caregivers per FGD<br><br>4 FGDs (2 per TA) with 8 influencers per FGD | Self-reported food-related contamination points specific to local context<br><br>Riskiest pathways and critical control points at food junctions<br><br>Report of similarities and differences of contamination points compared to the Chikwawa HACCP results |
| | | IDIs with household observations | 8 IDIs (4 per TA) with IYC caregivers<br><br>8 IDIs (4 per TA) with influencers | Observed food-related contamination points specific to local context<br><br>Perceptions about FH and HW behaviors specific to IYC caregiving (determinants: attitudes, feelings, barriers, facilitators, and others) |
| Objective 2 | Step 2:<br><br>Co-design acceptable, feasible, and desirable FH package | Hybrid FGD using product fair | 2 FGDs (1 per TA) with 8 IYC caregivers per FGD<br><br>2 FGDs (1 per TA) with 8 influencers per FGD | Desirable characteristics and attributes of HW stations<br><br>Acceptable and feasible locations of HW stations at the household for optimal uptake of HW at food junctions<br><br>Acceptable and feasible approaches to performing other FH behaviors at the household—reheating leftovers, storing cooked food in a container with lid and away from potential contamination sources, separating meat products from others when preparing, drying dishes on a rack<br><br>Desirable characteristics and attributes of FH hardware to encourage behavioral uptake at food junctions<br><br>Community-level influencers of HW and FH norms and practices |

| Study Objectives | Steps | Data Collection Method | Participant Group and Target Sample Size | Anticipated Outcomes |
|---|---|---|---|---|
| | | | | Caretaking and decision-making agents within the household |
| | | HCD community workshops | 2 workshops (1 per TA) with 8 IYC caregivers per workshop<br><br>2 workshops (1 per TA) with 8 influencers per workshop | Desirable characteristics and attributes of HW stations |
| | | | | Desirable characteristics and attributes of FH hardware |
| | | | | Features or props to improve the desirability of the prototype HW and FH hardware |
| | | | | Acceptability and desirability of the delivery channels of BCC messaging |
| | Step 3:<br><br>TIPs to pilot and refine intervention package | Surveys, observations, and structured interviews | 56 households<br><br>Targets per household: 1 IYC caregiver | Impressions about the provided FH hardware (user-friendliness, self-reported barriers, facilitators, ease of use, etc.) |
| | | | | Impressions about the provided HW stations |
| | | | | Observed barriers, facilitators, and compliance with recommended use of the FH package |
| | | | | Behavioral determinants of HW and FH behaviors at baseline and endline |
| | | | | Acceptability and desirability of BCC messaging content |
| | | | | Recommendations for further improvements of the intervention package, including the HW stations, the FH hardware, and the BCC messaging |

## 3.5    OBJECTIVE 1: VALIDATION OF HACCP

### 3.5.1    DATA COLLECTION

The WASHPaLS #2 team addressed Objective 1 using FGDs complemented by observations of food preparation/feeding within households of IYC, and through IDIs with primary caregivers and influencers of IYC. The team trained four data collectors fluent in Chichewa and English, who carried out data collection, accompanied by a field supervisor.

To anchor the discussion, the FGDs used a video vignette based on the hypothetical case of a woman who was not observant of all recommended hygiene practices (i.e., critical control points) identified in

the Chikwawa HACCP[3], when cooking, feeding, storing, reheating, and cooling food for her young child. The vignette also covered the handling of dishes. After watching each scene of the video, group facilitators asked participants their perceptions about the extent to which the woman's behaviors were common in Chiradzulu. Participants were each issued three cards with pictorial representations to indicate if they perceived the practice as very common, somewhat common, or rare/not at all common.

Topics generally covered each critical control point of the HACCP (i.e., storage, cooking, cooling, reheating, feeding) and included:

- Commonalities and differences between the woman featured in the video's approach to cooking for and feeding the child versus what most people in the community typically do; and
- Recommendations from the participants about any adjustments to the woman's behaviors to better protect the child's health and the support they would need to perform the behaviors.

A data collector also visited the households to engage in structured observations around HW and FH practices and note observations of the IYC of interest in the household (without direct interaction). The interviewers conducted caregiver and influencer IDIs immediately afterward and aimed to elucidate further insight into behavioral determinants of HW and FH practices described as typical or atypical in the FGDs and observed earlier in the day. Interviewers explored the behavioral determinants of HW and FH using a semi-structured, theory-based elicitation discussion guide[4], which included questions related to attitudes and feelings toward washing hands with soap and engaging in recommended FH behaviors, as well as perceived barriers to and facilitators of these behaviors.

### 3.5.2    DATA ANALYSIS

Analysis for the FGDs used an adapted framework analysis approach. Framework analysis is a systematic qualitative analysis approach that utilizes a matrix output where columns represent themes and rows represent data sources and/or respondent categories, allowing researchers to compare data rapidly across themes and participant types (Gale et al. 2013; Hackett and Strickland 2019). Annex 1 describes details of the data analysis process.

For IDIs and observations, the interviewers and note takers used structured debriefing forms and notes completed in English; tallies to aggregate responses when possible; and summaries of determinants of different HW or hygienic practices at the internal, structural, or social levels and as factors increasing or decreasing the likelihood of performing the behavior.

To prepare for the second step of data collection to address Objective 2, the team mapped the critical control points (e.g., cooking, feeding, storing) to potential hardware that could further facilitate the behavior for households and caregivers (e.g., types of feeding mats that could create a clean feeding surface, racks that could facilitate storage on raised surfaces).

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[3]    The Chikwawa HACCP identified critical control points for the two main complementary foods being provided to IYC: 1) maize-based porridge and 2) *nsima* (maize) and relish (vegetables/meat). In terms of porridge critical control points were identified as: cooking, where temperature should be adequate (i.e., 75 °C+); cooling, which should be achieved quickly, and food that should not be accessed by animals or flies. Children should be fed with clean utensils after the caregiver has washed her/his hands with soap. Critical control points for nsima and relish were similar to porridge (i.e., cooking, cooling, and feeding the child). Furthermore, since the nsima and relish are stored to be eaten during the next meal, additional critical control points included safe storage of food (controlled storage time and temperature; food must be covered) and reheating (up to boiling) before consumption.

[4]    See the Study Inception Report for data collection instruments (USAID WASHPaLS #2 Project 2023a).

## 3.6    OBJECTIVE 2: CO-DESIGN ACCEPTABLE, FEASIBLE, AND DESIRABLE HW AND FH HARDWARE PRODUCTS AND BCC APPROACHES

### 3.6.1    CO-DESIGN METHODS

#### 3.6.1.1 Data Collection

For Step 2 (see Figure 1)—co-designing a HW and FH intervention package—the team built on the findings from Step 1 and used HCD approaches to formative research (Burton et al. 2021). Annex 1 describes this process in detail.

The team began the co-design process with a series of product fairs with supplementary FGDs (termed "hybrid FGDs" here). Based on the critical control points that emerged from Step 1 and the range of products available in the TAs and Blantyre, the team assembled sets of enabling hardware products that could facilitate hygienic practices: drying racks, HW devices, feeding mats, feeding utensils (i.e., spoons, plates, cups), and food covers (i.e., storage containers, pot covers/lids).

The product fairs sought to engage participants through direct interactions with HW and FH hardware and used interactive data collection methods to gather information on the participant's perceptions of usability, feasibility, and desirability of the products (Morse, Tilley, et al. 2020). During the product fair, displays were set up in the vicinity of the hybrid FGD venue to present participants with a selection of HW and FH products. Participants browsed through the display to take a close look at the products and ask any questions about the product to the "vendor" (i.e., data collectors). Data collectors stationed within the market took written notes of interactions with the products using dedicated data collection forms. At each display, vendors presented participants with pictures of all the products displayed and asked them to take a picture of one product they liked the most per category of product (e.g., one picture of a preferred HW station, one picture of a type of storage container, one picture of a dishrack).

A FGD followed the product fairs to discuss the products displayed at the fair. To minimize potential biases from influencers' effect on caregivers, the team held separate FGDs for each category of respondents. The FGDs aimed to collect data on acceptability, desirability, and preferences for specific products. Participants took the printed pictures of their preferred products to the FGD room where the facilitator noted the number of participants who picked each product and conducted a discussion around the products chosen by participants. Participants also had the opportunity to make recommendations for potential improvements. Examples of topics included reasons for choosing the product, how they compared to other products shown in the market, the most/least appealing attributes of the products, ease of use or lack of ease, and suggestions for improvements. Following the hybrid FGDs, the team analyzed the data rapidly using detailed notes taken on thematic templates to identify components of the FH and HW hardware components, and the BCC messaging strategy to use in the HCD community workshops.

A key feature of HCD approaches is that they are iterative; therefore, for the second element of Objective 2—testing the intervention package to ensure it is acceptable, feasible, and desirable—the HCD workshops followed a similar format to the product fairs and hybrid FGDs. However, the team conducted these HCD workshops with a different group of caregivers and household influencers and focused on a narrower range of products and any improvements needed to the hardware, and BCC approaches to increase their acceptability, feasibility, and desirability. Participants were again able to interact with and use the hardware, and were asked a series of questions about their experience with the products. Questions aimed to understand how participants would use the products, elicit perceptions about the products (feelings, barriers and facilitators, and other perceptions), and obtain recommendations from participants for minor adjustments/improvements. The workshop also gathered participant's perceptions, preferences, and recommendations for strengthening the content and delivery approach of the BCC messaging.

### 3.6.1.2 Data Analysis

To iterate and refine the intervention package within the project timeline, the team conducted a rapid data analysis. As detailed further in Annex 1, the interviewers and note takers for the hybrid FGDs and the HCD workshop used English-language structured debriefing forms and notes and tallies to aggregate responses when possible.

### 3.6.2 TRIAL OF IMPROVED PRACTICES

Collaborating with World Vision, the research team used the Step 2 outcomes to design the subsequent iteration of the intervention package (comprising FH and HW products[5] along with BCC messages[6]). The team then piloted this package within the TIPs framework (Step 3), which allows end users to pilot intervention candidates or prototypes in a real-world setting and provide recommendations and feedback before scaling up (see Annex 1 for more detail about this methodology). The team documented users' experiences with the hardware, focusing on its acceptability and desirability in fostering desired behavioral changes over time. Finally, the team gathered recommendations for minor enhancements to both the hardware and content and delivery channels of BCC messaging. Annex 1, Figure A-3 shows the intervention components piloted within the TIPs framework.

The team then used the data collected from TIPs to determine a final set of acceptable and desirable hardware and BCC messaging content, along with preferred delivery channels for both HW and FH information in Chiradzulu.

### 3.6.2.1 Data Collection

The research team selected households having an appropriately aged child in the household; the data collection team also made efforts to recruit families with varying wealth levels, distance to water source, and households with disability. Primary caregivers—the respondents—were the main household member who directly attends to, feeds, or prepares food for IYCs aged 6–23 months. The team trained the data collectors to both collect data and deliver the BCC and hardware elements of the intervention. Table 2 presents a summary of the activities and data collection that took place at each visit over the 28 days of the TIPs.

**Table 2. Summary of data collection activities and schedule**

| Data Collection and Activities | Day 0 | Day 1 | Day 10 | Day 28 |
|---|---|---|---|---|
| Consent, visit schedule, socio-demographics | Yes | | | |
| Documentation of existing FH and HW practices and products | Yes | Yes | | |
| HW and FW products delivered:<br>• Traditional arm: outdoor bamboo rack with attached leaky tin (HW device) and split bamboo mat with a maize sack topper<br>• Aspirational arm: two-tier wire rack, bucket with a tap, woven plastic mat<br>• Both arms: bar soap, child feeding kit (plastic spoon, plastic plates, plastic cup), plastic food storage container | | Yes | | |
| BCC messages provided through booklet (summary of healthy FH and HW behaviors and hardware) and poster (illustrated version of healthy FH and HW behaviors) | | Yes | | |
| Asked questions regarding recommended FH and HW behaviors and enabling hardware to elicit barriers, facilitators, motivators, etc. | | Yes | Yes | Yes |

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5   Further discussed with illustrations in Section 4.2.

6   Feedback from Step 2 on preferred mediums for receiving BCC messaging were integrated with previous learning from BCC approaches used in Southern Malawi (namely, the Hygienic Family Trial and Water Sustainable Point of use Treatment Technologies (WaterSPOUTT)), which were based within the Risks, Attitudes, Norms, and Abilities methodology (Morse et al. 2019; Morse, Luwe, et al. 2020; Mosler 2012).

| Data Collection and Activities | Day 0 | Day 1 | Day 10 | Day 28 |
|---|---|---|---|---|
| HW and FW products delivered:<br>• Traditional arm: bucket with a tap, indoor bamboo shelf<br>• Aspirational arm: freestanding leaky tin installed at location of their choice<br>• Both arms: soapy water bottle instructions, an additional bar soap | | | Yes | |
| Asked questions regarding practice of recommended behavior and use of provided products | | | Yes | Yes |
| Observation of condition and location of provided products | | | Yes | Yes |
| 24-hour recall of recommended behaviors and provided product use | | | Yes | Yes |
| Collected final remarks about recommended behaviors and provided products | | | | Yes |

### 3.6.2.2 Data Analysis

The team summarized the baseline characteristics of the participants, including age and gender of child, sociodemographic characteristics of the primary caregiver, and household specifics (e.g., total household members, monthly income, availability of water and sanitation facilities, and existing HW and FH products within the household), in tabular form and descriptive statistics. Categorical variables included the presentation of the number and percentage of participants in each category. Continuous variables included the presentation of the number of participants, means, and standard deviation.

To establish an acceptable and desirable combination of HW and FH products in Chiradzulu, the team analyzed data for each provided product to gather insights into usage, barriers, and facilitators related to product usage, modifications made to enhance effectiveness, and preferences regarding product types. The team refined the intervention package based on participant use patterns and preferences, using the identified barriers and facilitators to inform potential BCC strategies to support use.

- *Usage of the provided product*: A descriptive analysis for each provided product summarized the number and percentage of users and non-users. A rapid thematic analysis of qualitative responses summarized the reasons provided by the caregivers for not using the provided product to facilitate recommended hygiene behaviors. The team summarized the reported factors that aided or hindered the use of the provided product for the recommended hygiene behaviors, disaggregated by users and non-users, including characterizing reasons as primarily related to the feasibility or desirability of the product/behavior. Also presented were bivariate descriptive analyses with disaggregation by visits.
- *Preferences for types of HW stations, soap, mats, food storage container, and dish drying racks*: On Day 28 visit, the team surveyed all households regarding their preferences for products to facilitate the recommended hygiene behavior. A descriptive table summarized these reported product preferences.
- *Changes made to the provided products to make it easier to use, clean, and maintain (i.e., feasibility)*: Researcher conducted a rapid thematic analysis of qualitative responses regarding modifications made to the products to make them easier to use and clean for each provided product.

For data on acceptable and desirable messaging content and delivery channel(s) for HW and FH BCC messaging, the rapid thematic analysis included a summary of caregiver feedback on the usefulness of the booklet, any aspects of the booklet that were particularly confusing or missing, and any information they felt was unnecessary, and preferred delivery channels for receiving information on HW and FH in the future. (See Annex 1 for details about data analysis.)

# 4.0 FINDINGS

## 4.1 OBJECTIVE 1: HACCP VALIDATION

### 4.1.1 PARTICIPANTS

The research team split FGD and observation/IDI participants evenly across IYC age groups and TAs, as indicated in Table 3. All caregivers selected were the biological mothers of the targeted IYC. For the FGDs, influencers included maternal grandmothers of the IYC's, maternal aunts of the IYC, and a small number of neighbors. The influencers who participated in IDIs were primarily maternal grandmothers and aunts of the IYC who lived in the same household or next door. The age of mothers of IYC ranged from 18 to 34 years, while influencer age ranged from 18 to 77 years.

**Table 3. Sample distribution for FGD and Observation/IDI participants**

|  | FGD Participants (N=64) | Observations/IDI Participants (N=16) |
|---|---|---|
| **IYC age group** | | |
| 6–11 months | 32 | 8 |
| 12–23 months | 32 | 8 |
| **Traditional authority** | | |
| Mpama | 32 | 8 |
| Onga | 32 | 8 |

### 4.1.2 COMMON PRACTICES AND BEHAVIORAL DETERMINANTS

Triangulating across the FGDs, observations, and IDIs, here the team summarizes typical hygienic and unhygienic practices (i.e., hazards) and determinants by critical control point of the HACCP, namely cooking and reheating foods, cooling foods and feeding IYC, and cleaning and storing utensils and leftover foodstuffs. The team notes HW practices with cooking and reheating and with child feeding steps.

*a. Cooking and Reheating*

Table 4 summarizes typical hazards and hygienic practices identified during cooking and reheating, while Table 5 summarizes relevant barriers, facilitators, and motivators to hygienic practices across individual, structural, and social levels. Many households discussed and observers saw them using hygienic food practices during cooking and reheating of foods—particularly ensuring heating foods to a boil (Photo 1); participants often described the taste of heated food as a driver of this practice, in addition to the food safety considerations. Many caregivers rested their stirring stick on an elevated surface to avoid contamination (Photos 1 and 2), typically noting this is a habit "they are used to," although observers noted some stirring sticks leaning against the wall (Photo 2). Participants spoke of the hygienic value of scooping ingredients like flour using a cup (Photo 2) but noted that it was more convenient to use a hand and that they customarily use their hand.

Despite frequent discussion of the benefits of HW, observations and descriptions noted that using soap for HW was extremely limited across all locations, participant types, and data collection modalities. During FGDs and IDIs, participants described that rinsing hands with clean water was the typical practice to prepare for cooking, although there was disagreement on whether it was better to scrub hands in a basin to remove dirt or to use running water (e.g., a basin and jug). Despite likely presence of water due to it being the rainy season and recent program investments in tubewells and boreholes,

during observations, it was more typical for household members to rinse their hands in a basin of water reused throughout the day (e.g., for rinsing vegetables or other household purposes and rinsing hands), rather than using fresh water for each use. Observers also noted drying hands on a skirt or wrapper, rather than a clean towel or air drying. During FGDs and IDIs, participants described that soap was costly and often prioritized for other household uses, such as laundry or bathing. The common benefits or motivators mentioned for HW during food preparation were prevention of disease—usually diarrhea or cholera, but occasionally parasites or malaria. While participants described tippy taps as common during FGDs, during observations and IDIs, they were rare and mostly inoperative (e.g., no lever stick, no water/dirty water; Photo 3). The team did not observe anyone using soap for HW during food preparation during fieldwork. Each village visited had nearby access to at least one borehole.

For both HW and FH practices during cooking and reheating foods, participants typically described that their families and communities accepted and encouraged these practices, but some family and community members may feel they are not a good use of time or household resources or could even mock someone for taking the time to do these things. During observations, the team noted the presence of chickens and dogs in many cooking areas, as well as a general lack of elevated surfaces such as tables, where caregivers could place utensils or ingredients while cooking.

**Table 4. Summary of hygienic practices and hazards for cooking and reheating**

|  | Hazards | Hygienic Practices |
|---|---|---|
| FH | • Washing vegetables, hands, and utensils in same water<br>• Using unwashed hands to scoop flour<br>• Storing foodstuffs uncovered/not covered well | • Resting stirring spoon across top of pot or on a basin<br>• Fully heating cooked dishes (e.g., *nsima*, relish, porridge)<br>• Fully reheating leftovers before feeding |
| HW | • Not washing hands correctly (i.e., not using soap, reusing water, drying on wrapper)<br>• Not washing hands at all when interrupted<br>• Tippy taps by latrines were limited and often not functional<br>• No HW with soap observed during cooking |  |



*Photo 3. A typical indoor cooking setup, stirring stick is across pot (left): food is brought to boiling (right)*

*Photo 2. Typical placement of stirring spoons while cooking (same household); across maize flour basin (left) or against wall (right); left photo also features a cup for scooping maize flour*



*Photo 3. Tippy taps observed during fieldwork*

**Table 5. Determinants of hygienic practices during cooking and reheating**

|  | Barriers | Motivators | Facilitators |
|---|---|---|---|
| Internal | • Poor habits ("what we are used to," e.g., scooping flour with hands, leaning stirring stick against wall) | • Perceived risk of cholera and other diarrheal diseases<br>• Some practices seen as easier/more desirable than alternative (e.g., food tasting better reheated) | • Good habits ("being used to:" e.g., placing stirring spoon across pot) |
| Structural | • No table/elevated surface for foodstuffs<br>• Livestock in cooking/feeding area |  | • Adequate water<br>• Having a table or elevated surface for placing foodstuffs |
| Social | • Perception that peers/friends discourage hygienic behaviors out of jealousy/spite<br>• Children and/or husbands rushing caregiver for food | • Grandmothers and HSAs as motivators<br>• Desire to be appear as a "good" mom |  |

*b. Cooling and Feeding Foods for IYC*

Table 6 summarizes typical unhygienic and hygienic practices for cooling foods and feeding IYC based on findings in the study, including washing caregivers' and IYC's hands. Table 7 outlines barriers, motivators, and facilitators across individual, structural, and social levels.

Hygienic practices varied somewhat across households with younger and older IYC (i.e., 6–11 months versus 12–23 months). Caregivers typically fed IYC in the younger age group in their lap while older IYC more often ate with other children and family members (Photo 4). Caregivers and influencers described typically using a spoon for runny or liquid foodstuffs like porridge, but noted they may use hands for snacks like mango or more solid foods like *nsima*; observation confirmed this.

For both older and younger IYC, it was common to provide the child with their own plate or bowl. While some caregivers in the FGD said they used split bamboo mats sometimes for feedings, the observers did not see this in the field—although they observed two households using an empty maize sack for this purpose (see Photo 4 for an example of a maize sack and child feeding utensils). Based on observation, it was typical to feed children on the veranda floor or inside the home on the floor; floors were typically mud/earth, with a few rare houses having cement or concrete floors. Caregivers and influencers typically left dishes of food to cool uncovered to speed the process and prevent burns. Observers noted chickens and dogs in the area where caregivers/influencers left food to cool. During FGDs, caregivers and influencers said they typically replaced/took snacks or food from the child that fell on the floor, but observers did not witness this.

As with food preparation, participants typically described rinsing hands with water instead of using soap; observers noted only one household washing hands with soap prior to feeding. Observers described that IYC hands were washed together with the caregiver's hands in one basin of water. Observers did not see any participants rewash their own hands or the IYC's hands if they touched something unclean during the meal, although participants in the FGDs discussed they rewashed hands normally. Some participants said only IYC who were self-feeding needed to wash hands for mealtimes or that it was not necessary to wash their own hands if the IYC was self-feeding.

As with cooking and reheating foods, participants were typically conversant in the benefits of hygienic practices and said that others around them encouraged the enactment of healthy behaviors, but a lack of materials such as soap or child-appropriate mats hindered them.

**Table 6. Summary of hygienic practices and hazards for cooling and feeding**

|    | Hazards | Hygienic Practice |
|----|---------|-------------------|
| FH | Post cooking contamination of food due to:<br>• Leaving cooling food uncovered or with a poorly fitting cover<br>• Leaving cooling food at low surface/exposed to animals<br>• Feeding IYC on the bare ground or veranda floor<br>• Allowing IYC to eat a snack or use a spoon that has fallen to the ground or exposed to animals | • Feeding young IYC on caregiver's lap<br>• Using spoon for feeding young IYC<br>• Feeding IYC from their own plate/bowl |
| HW | Contamination of food and/or feeding of pathogens due to:<br>• "Incorrectly" washing hands<br>• Not washing hands at all when interrupted<br>• "Incorrectly" washing IYC hands<br>• Not washing IYC hands at all<br>• Not washing IYC hands after they touch dirty things | |

*Photo 4. Dedicated child feeding utensil and maize sack used as a feeding mat (left); typical child feeding setups on floor or veranda with dishes set up for younger and older children (middle, right)*

**Table 7. Determinants of hygienic practices during cooling and feeding**

| | Barriers | Motivators | Facilitators |
|---|---|---|---|
| Internal | • Low perceived risk or low perception of benefit of practices e.g., food will cool slowly if covered<br>• Poor habits ("what we are used to," e.g., allowing older IYC to eat on ground) | • Perceived risk of cholera and other diarrheal diseases<br>• Some practices seen as easier/more desirable than alternative (e.g., easier to feed porridge with spoon than hand) | • Good habits ("being used to" e.g., placing child on lap) |
| Structural | • No HW station in eating area<br>• No money for soap<br>• No feeding mat, or only a mat they do not feel is acceptable for child feeding (i.e., split bamboo)<br>• Livestock in cooking/feeding area | | • Adequate water for HW<br>• Having child-appropriate feeding utensils<br>• Adequate soap for HW and other household needs (e.g., bathing, laundry)<br>• Having a sack for a feeding mat |
| Social | • Do-it-yourself (DIY) HW stations (e.g., tippy tap) associated with latrine use, not HW for feeding<br>• Perception that peers/friends discourage hygienic behaviors out of jealousy/spite<br>• Husbands may discourage "wasting" money on HW soap<br>• IYC, especially those who are older, may not cooperate with hygienic practices | • Grandmothers and HSAs as motivators<br>• Desire to appear as a "good" mom | |

*c. Cleaning and Storing Utensils and Foodstuffs*

Table 8 summarizes typical practices for cleaning and storing cooking and feeding utensils, as well as storing foodstuffs. Table 9 outlines barriers, motivators, and facilitators across individual, structural, and social levels. During FGDs, some participants described washing dishes immediately following a meal, but others described resting after cooking and doing dishes the next day. While observers noted some households using soap for washing utensils, many used only water. Many households tried to store their clean dishes at elevated surfaces but lacked dedicated materials for this purpose, such as racks, shelves, tables, or cabinets. However, about one household per village in the IDI sample did have a dedicated wire storage rack (Photo 5 shows several examples). Photo 5 also shows other storage methods for dishes.

Families also typically made efforts to store foodstuffs on elevated surfaces and observers witnessed most families covered leftover cooked foods with available plates or buckets but did not have items like containers with tight fitting lids (Photo 6). Families typically stored uncooked foodstuffs uncovered (Photo 6).

While caregivers and influencers were aware of the hygienic benefits of covering foods and elevating foods and dishes, they also cited convenience, safety, and other factors as reasons for trying to practice these behaviors, such as keeping children from knocking over dishes, keeping animals out of foodstuffs, and food tasting better from clean pots and utensils.

**Table 8. Summary of hygienic practices and hazards for cleaning and storing utensils and foodstuffs**

| | Hazards | Hygienic Practices |
|---|---|---|
| FH | Contamination of food due to:<br>• Covering leftovers with unhygienic covers<br>• Covering leftovers with ill-fitting covers<br>• Storing dishes in poorly drained basin | • Storing clean dishes and utensils on makeshift elevated surfaces (e.g., on top of water storage buckets, chairs)<br>• Storing ingredients and/or leftover foods on makeshift elevated surfaces |

**Table 9. Determinants of hygienic practices during cleaning and storage**

| | Barriers | Motivators | Facilitators |
|---|---|---|---|
| Internal | • Low perceived risk or low perception of benefit of practices like storing clean dishes at ground level | • Perceived risk of cholera and other diarrheal diseases<br>• Some practices seen as easier/more desirable than alternative (e.g., storing dishes and foods at elevated surfaces keeps children out of them) | |
| Structural | • No drying rack or other elevated surface<br>• Not having money for well-fitting lids/lidded containers<br>• Livestock in cooking/feeding area | | • Adequate water and soap<br>• Having a chair or shelf for elevated storage of foodstuffs<br>• Having a rack for drying and storing utensils |
| Social | • Perception that peers/friends discourage hygienic behaviors out of jealousy/spite<br>• Husbands may discourage spending money/time on hygienic behaviors/products<br>• Children washing dishes poorly | • Grandmothers and HSAs as motivators<br>• Desire to appear as a "good" mom | |

*Photo 5. Utensil drying/storage options: utensils kept in basin where washed (left), pots stacked on a windowsill (center left), utensils kept in a wall-mounted wire rack kept indoors (center right), utensils stored in a small wire rack kept low to ground (right)*



*Photo 6. Food storage practices: maize flour in buckets (left), prepared food kept on raised surface before cooking (middle), leftovers stored covered with a plate on top of covered water storage (right)*

### 4.1.3    SUMMARY AND APPLICATION FOR OBJECTIVE 2

Results of the FGDs, observations, and IDIs indicate that the critical control points for safe preparation and feeding of complementary foods for IYC in Chiradzulu are consistent with those identified in the HACCP conducted in Chikwawa. These are centered around food preparation (including storage of ingredients and leftover foods, handwashing with soap, and use of clean utensils) and child feeding (including safe cooling of foods, washing hands with soap, feeding on a clean surface, and use of clean utensils). For those critical control points confirmed to be an issue (see Table 10), we mapped hazard points to potential hardware types that could facilitate more hygienic practices, including HW stations, drying racks, feeding mats, and a range of feeding utensils and food covers. We assembled two to four options that were available either locally or from commercial centers in Blantyre for each type of hardware to give caregivers and influencers a chance to provide feedback on which would be most acceptable (including affordable) and desirable for their households. These options were taken into the co-design phase.

**Table 10. Alignment of critical control points with TIPs hardware**

| Critical Control Points/Practices (CCPs) identified in Chikwawa HACCP | Step 1 Findings: Chiradzulu HACCP validation | CCP confirmed as problematic in Study Area | Hardware identified for testing in Step 2 Ordered from lowest cost to highest cost |
|---|---|---|---|
| **Cooking (inclusive of food preparation)** | | | |
| Store ingredients away from animals (i.e., elevated surface) | • Ingredients often stored on elevated surfaces, but not adequately covered and not out of reach of all animals | • Yes, although thorough heating of foods can mitigate risk | Drying Rack (can be used for storage) <br>• Single tier bamboo rack <br>• 3-tier wire rack <br>• 3-tier plastic rack |
| Wash hands with soap during food preparation | • Washing hands with soap described as beneficial, but use of soap observed very rarely, despite many houses having soap (being used for bathing and laundry) and ample water, given it was rainy season <br>• Despite claims of widespread tippy taps during FGDs, no functional tippy taps observed in field; majority of homes 'dipped' hands in basin, water reused for multiple household purposes | • Yes | HW Station <br>• Tippy tap <br>• Basin with jug <br>• Bucket with tap <br>• Sato Tap <br><br>Soap <br>• Bar soap <br>• Liquid soap |
| Heat ingredients to boiling | • Described and observed as common | • No, CCP practiced as desired | • No hardware featured in Step 2 |
| Use clean utensils for handling ingredients (i.e., maize flour) and cooking, including keeping utensils off ground, to prevent contamination | • Some utensils not washed with soap <br>• Normally stored at ground level, often in wash basin (i.e., not fully dried) <br>• About ¼ of houses had wire racks | Yes | Soap <br>• Bar soap <br>• Liquid soap <br><br>Drying Rack (can be used for storage) <br>• Single tier bamboo rack <br>• 3-tier wire rack <br>• 3-tier plastic rack |
| **Cooling** | | | |
| Cover foods while cooling to prevent contamination from pests | • Mixed reactions to this recommended behavior, as most believed it is more beneficial to cool child's food quickly (i.e., uncovered) to prevent burning child. | Yes | • Serving dish with cover <br>• 'Universal' pot/bowl cover |
| **Feeding the child(ren)** | | | |
| Wash hands with soap before/during feeding of IYC | • Washing hands with soap described as beneficial, but use of soap observed very rarely, despite many houses having soap (being used for bathing and | Yes | HW Station <br>• Tippy tap <br>• Basin with jug <br>• Bucket with tap |

| Critical Control Points/Practices (CCPs) identified in Chikwawa HACCP | Step 1 Findings: Chiradzulu HACCP validation | CCP confirmed as problematic in Study Area | Hardware identified for testing in Step 2 Ordered from lowest cost to highest cost |
|---|---|---|---|
| | laundry) and ample water, given it was rainy season<br>• Despite claims of widespread tippy taps during FGDs, no functional tippy taps observed in field; majority of homes 'dipped' hands in basin, water reused for multiple household purposes | | • Sato Tap<br><br>Soap<br>• Bar soap<br>• Liquid soap |
| Wash IYC hands with soap before they eat/ after they touch dirty things | • Washing IYC hands with soap generally described as beneficial, but only seen as critical for self-fed IYC. When IYC hands were washed, typically observed dipping hands in same basin as caregiver (no soap) | • Yes | |
| Feed IYC on a clean surface | • Described and observed that younger IYC are often fed in caregiver's lap<br>• Older, self-fed IYC observed as often eating on veranda or outdoors on dirt or mud surface<br>• Many households had bamboo mats, but were used as sleep mats and not seen as appropriate for child feeding<br>• One household observed feeding child on maize sack | • Yes | Feeding mat<br>• Split bamboo mat<br>• Maize sack.<br>• Woven plastic mat<br>• Foam tile mat<br>• Flexible foam mat |
| Use clean utensils for IYC feeding | • Some utensils not washed with soap<br>• Common for IYC's to be fed from family bowls and plates<br>• Normally stored at ground level, often in wash basin (i.e., not fully dried)<br>• IYC described and observed as being fed porridge with a spoon, while other foods fed with hands (esp. for self-feeding child) | Yes | Feeding spoon<br>• small metal spoon<br>• small plastic spoon<br><br>Child plates<br>• Divided plate<br>• Flat plate<br><br>Child cup<br>• Open cup<br>• Covered 'sippy' cup'<br><br>See notes above on rack and soap options re: cleanliness of utensils |

| Critical Control Points/Practices (CCPs) identified in Chikwawa HACCP | Step 1 Findings: Chiradzulu HACCP validation | CCP confirmed as problematic in Study Area | Hardware identified for testing in Step 2 Ordered from lowest cost to highest cost |
|---|---|---|---|
| **Storage of leftovers** | | | |
| Cover leftover foods | • Leftovers often covered with makeshift objects, such as a bucket, pot, or plate | Yes | Food storage container with lid • Single compartment container • Divided container |
| Store leftover foods away from animals (i.e., elevated surface) | • Leftovers often observed stored on elevated surfaces, but not out of reach of all animals (e.g. on top of a chair or a water storage bucket) | Yes | Drying Rack (can be used for storage) • Single tier bamboo rack • 3-tier wire rack 3-tier plastic rack |
| **Reheating** | | | |
| Heat leftover foods to boiling before feeding IYC | • Described and observed as common | No | • No hardware featured during HCD exercises |

## 4.2    OBJECTIVE 2: CO-DESIGN ACCEPTABLE, FEASIBLE, AND DESIRABLE HW AND FH HARDWARE PRODUCTS AND BCC APPROACHES

### 4.2.1    CO-DESIGN

This section summarizes the characteristics of participants involved in the first round of hybrid FGDs and the second round of HCD workshops and then describes feedback and preferences for hardware types and BCC approaches.

#### 4.2.1.1 Participants

Participants for both hybrid FGDs and HCD workshops were split evenly across IYC age groups and TAs, although the caregiver HCD workshop in TA Onga only had seven participants versus the target of eight participants (Table 11). All caregivers who participated were the biological mothers of the target IYC. Influencers were all women living in the same household as the IYC—primarily maternal aunts and grandmothers of the IYC. Caregivers ages ranged from 18-37 for the hybrid FGDs and 18-41 for the HCD workshops. Influencers ages ranged from 19-56 for the hybrid FGDs and 24-75 for the HCD workshops.

**Table 11. Distribution of study participants**

| | Hybrid FGDs (N=32) | HCD Workshops (N=31) |
|---|---|---|
| **IYC age group** | | |
| 6–11 | 14 | 16 |
| 12–23 | 18 | 15 |
| **Traditional authority** | | |
| Mpama | 16 | 16 |
| Onga | 16 | 15 |

### 4.2.1.2 Enabling Technologies and Solutions

**a. HW Stations**

Photo 7 shows the HW stations featured in the initial hybrid FGD product fairs. Table 12 presents vote tallies and overarching themes about preferences that emerged from the FGDs. The tippy tap and bucket with tap emerged as clear preferences. Participants who chose the tippy tap remarked that it was familiar and affordable. Those who preferred the bucket with tap liked that it could hold more water than a tippy tap or the other options on display but questioned the durability, especially considering the higher cost than other options. While the basin with a cup or jug was familiar to participants, they did not feel it was very practical, especially when the caregiver does not have someone to assist with pouring the water. While some were interested in the Sato tap, few chose it as a preferred product due to its novelty and assumed high cost.

Given the preferences observed from the hybrid FGDs, the WASHPaLS #2 team selected to feature the bucket with tap and tippy tap at the HCD workshop. Similar themes emerged—with the bucket with tap seen as more desirable, but the tippy tap seen as more feasible given household constraints. Specifically, participants in the workshops liked that the bucket with tap held enough water to use for multiple household purposes and that they did not need to refill it after each use. Aside from cost, there were limited concerns about the bucket with tap, but some participants mentioned that someone could steal it, the household would need to find an elevated surface on which to keep it, children may play with it, and they did not like the color. When asked how much they would be willing to pay for a bucket with a tap, responses ranged from K500 to K4000 (market price is K5100 for 20-liter bucket). When discussing the tippy tap, participants liked that the version built for the co-design sessions was portable and had a soap holder, which they felt was an improvement over the versions they had seen in their villages. Otherwise, they liked that the materials were available for free or low cost, and they could make it themselves. When asked what could improve the tippy tap, they mentioned having a higher flow rate and/or larger bottle of water, preferring it to be taller to avoid bending down, and using metal instead of wood (to improve durability to termites). A few groups discussed the association of the tippy tap with the latrine and reiterated others would mock them for using it in the kitchen area or that it would seem "strange."
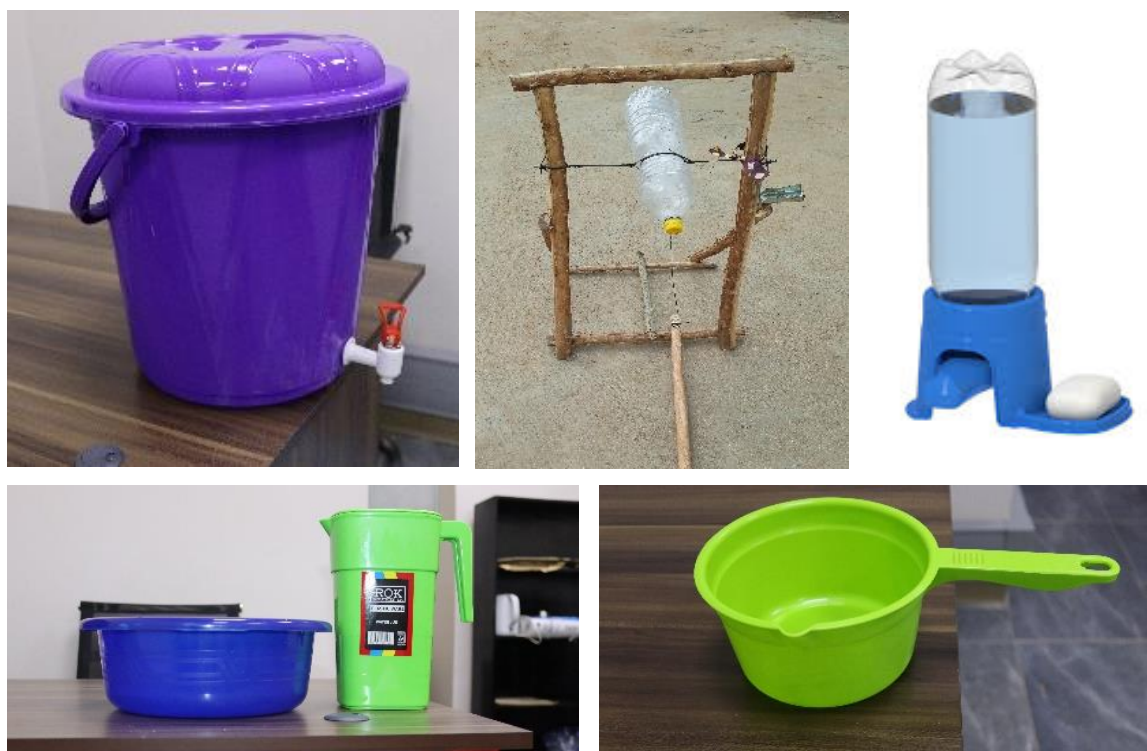
*Photo 7. Bucket with tap (top left), tippy tap (top center), Sato tap (top right), basin with jug and cup (bottom),*

While there was no structured data collection around types of soap, both bar soap and liquid soap were available at the station and participants were free to use either during the demonstration periods and before taking snacks—most participants opted to use the bar soap. Some participants noted they preferred ash or a soapy water bottle instead of bar soap, which children would steal. Some noted that the bar soap brand on offer required excessive water to fully rinse from hands and dishes.

**Table 12. Summary of hybrid FGD vote tallies and discussion of preferences for HW stations**

| Product | Votes | Notes |
|---|---|---|
| Tippy tap* | 14 | Materials for constructing the tippy tap are locally available, easy and cheap to construct |
| Bucket with tap* | 13 | More spacious and hence families can fill it with more water, but if broken, difficult to mend; expensive and can break easily |
| Sato tap | 3 | Liked the way it looks, seems portable and modern, but expensive and not locally available |
| Basin with cup or Jug | 2 | Difficult to use when alone, but a common facility used in most households |

*Advanced to HCD workshop*

*b. Drying Racks*

Photo 8 shows the three styles of dish drying racks featured in the initial hybrid FGD product fairs; presenters used a photo of a bamboo rack because it was not possible to construct a portable option. Table 13 presents vote tallies and overarching themes about preferences that emerged from the FGDs. The wire rack and bamboo rack emerged as preferred, with similar themes as seen with the HW stations: the wire rack was the more desirable product in terms of features, but households saw the bamboo rack as feasible for households to build and afford. While some participants liked the color and

modernity of the plastic rack, most largely dismissed it as too expensive, especially compared to its perceived low durability and difficulty to clean.


*Photo 8. Bamboo rack (left), wire rack (center), plastic rack (right)*

For the second round of workshops, the team focused on just the wire rack and the bamboo rack. Participants discussed similar considerations around balancing quality with cost. Specifically, for the wire rack, participants liked that it was portable and had multiple tiers. They also saw it as extremely durable. Other than cost, few raised concerns, but some suggested that handles would improve the function and that a section with smaller spaces would prevent utensils such as spoons from falling through. When discussing the bamboo rack the team displayed, some participants liked the addition of a HW station to the rack—which they had not seen before—and commented that the rack was better quality than those they had seen in their villages. Suggestions for improvements to the bamboo rack included adding additional shelves; one group felt the attached HW station would create muddy conditions and preferred placement of the HW device elsewhere. Overall, participants liked the availability and low cost of the bamboo rack but had concerns about the durability and the lack of portability of the rack, especially during rainy season and considering potential theft.

**Table 13. Summary of hybrid FGD vote tallies and discussion of preferences for drying racks**

| Product | Votes | Notes |
|---|---|---|
| Wire rack* | 14 | Expensive but it lasts longer |
| Bamboo rack* | 13 | Materials easily accessible, cheap to construct. |
| Plastic rack | 5 | Nice design and color, but not durable or easy to clean, as it gets dirty easily and requires soap to clean |

*Advanced to HCD workshop*

### c. Feeding Mats

Photo 9 shows the four styles of feeding mats featured in the initial hybrid FGD product fairs; a maize sack was added as a "latebreaker" based on household observations—the team did not have a maize sack on display, but the "station manager" described it during the introduction of the mats and offered it as a choice during the voting exercise. Table 14 presents vote tallies and overarching themes about preferences that emerged from the FGDs. As seen with HW stations and wire racks, two product types emerged as preferences—one higher-cost, more desirable option, and one lower-cost and easily accessible option: the imported woven plastic mat (*mkeka*) and the local split bamboo mat (*mphasa*). While participants also liked the look and soft feel of the tile mat and flexible mat, they largely dismissed the mats as too expensive and unavailable locally. Participants described the maize sack as affordable, durable, and widely available but ultimately did not prefer it over other options during the product fairs.

*Photo 9. Woven plastic mat (left), split bamboo mat (center left), tile mat (center right), flexible mat (right)*

The HCD workshops featured the woven plastic mat and split bamboo mat, where participants again juxtaposed the preferred qualities of the woven plastic mat to the affordability and wide availability of the split bamboo mat. Key qualities of the woven plastic mat that participants preferred included the soft material that would not pinch IYC and the large size that would keep child off the ground even if they were crawling. Other than cost, a few groups discussed that washing and drying the mat could be a challenge given the number of small crevices. For the split bamboo mat, in addition to the low cost, participants believed it easy to clean. The potential to pinch or prick the child was a primary concern about the split bamboo mat, but participants also mentioned that a cloth placed on top could mitigate the risk.

**Table 14. Summary of hybrid FGDs vote tallies and discussion of preferences based for feeding mats**

| Product | Votes | Notes |
|---------|-------|-------|
| Split bamboo* | 17 | Split bamboo mat (*mphasa*) was the most preferred because it is cheap, dries faster when washed, and is locally available; it can pinch/pierce a child playing on it, however |
| Woven plastic* | 9 | Liked because it is durable and soft for the baby, but expensive and not available on the local market |
| Flexible | 2 | Soft and easy to clean, but expensive and not locally available in the market |
| Tile | 2 | Soft, good because it serves as a teaching material for the child, but can easily get damaged by children and the tiles can easily get lost |
| Sack (not shown) | 2 | Cheap, durable, easy to store and carry, and locally available; made of thin material and is not good to lay on ground with a lot of dust |

*Advanced to HCD workshop*

**d. Utensils and Food Covers**

For the product fair, the team grouped child feeding utensils (plates, spoons, cups) and food covers into two "kits" to facilitate and streamline the voting process, but also noted comments and preferences on individual items within each kit to ensure the best mix of items for further refinement. Photo 10 shows the two kits, and Table 15 summarizes feedback on the items in the kits. Overall, the kit that featured the divided plate and storage container received more votes during the hybrid FGDs, but participants also liked some of the individual items or aspects of items in the kit with the flat plate—in particular, participants preferred the plastic material of the flat plate to melamine, which they perceived to be less durable. They also liked the opaque color of the food storage container. Participants felt the open cup would be appropriate for an older IYC but preferred the sippy cup because the lid could keep dust out of the liquid. Participants worried about the metal spoons burning the child or rusting. Participants liked the divided plate for feeding *nsima* and relish but preferred the flat plate for porridge. Overall, the concept of using a food cover while cooling foods did not resonate with participants, as they preferred food for IYC to cool quickly to prevent burns and felt that covering the food would be counterproductive. The HCD workshop displayed the items from the kit with the divided plate—participants again stated preferences for a plastic plate and worried that the metal storage container could burn a child or dent easily, but otherwise were positive about the products.

*Photo 10. Child feeding utensil and food cover kits featured at the hybrid FGDs*

**Table 15. Summary of preferences based for feeding utensils and food covers from hybrid FGDs**

| Product | Feedback from Participants |
|---|---|
| Sippy cup* | Liked because it had a cover, but wished it was a little bit bigger; good for children with no teeth, but a child who is teething will chew the cover |
| Open cup | Cheap, but absence of a cover can lead to contamination of contents |
| Plastic spoon* | Durable and cannot burn the child while feeding |
| Metal spoon | Not good for a child because when feeding a child hot food, metal spoon becomes hot as well |
| Divided plate* | Ideal when feeding a child *nsima* since one can separate *nsima* and relish into their own sections |
| Single section plate | Good for porridge and can easily cool but is not ideal for other meals like *nsima* and relish because they can mix |
| Divided container* | Durable, divisions maximize storage space |
| Single section Container | Cheap but too big if only used to store food for the child; container also thin and flimsy |
| Container with a lid* | Durable, keeps food warm and thus good for storage, but not good when feeding a child, as the container can be hot. More appropriate as extra cooking pot. |
| Cover | Can use as a tray |

*Advanced to HCD workshop*

**e. BCC Approaches**

As noted previously, the team worked with HSAs to assemble BCC materials that HSAs currently use with different types of communication approaches, namely facilitated discussions (e.g., flipcharts for home visits or group meetings conducted by an HSA), visual materials (e.g., posters), audio materials (e.g., radio spots or loudspeakers), and self-teaching materials (e.g., pamphlets). The team introduced each of these approaches to HCD workshop participants and showed them examples of BCC materials that had been produced by previous nutrition, health, and hygiene programs. The team asked participants to rank their preferred approach, and they overwhelmingly chose facilitated discussions. Rationale focused on the ability to ask questions, although participants did note that scheduling could be a problem, with both households and HSAs sometimes needing to cancel. Criticisms of the other approaches often focused on low literacy and poor access to televisions, radios, or phones.

### 4.2.1.3 Summary and Application for Trials of Improved Practices

In a final wrap-up exercise for the HCD workshops, participants took part in a series of dot voting exercises to evaluate hardware preferences and BCC approach preferences. In the first step, a list of each underlying hygienic practice accompanies an illustration, and participants indicated the top four they felt they could realistically incorporate into their daily routines. Table 16 summarizes the responses. While there was some variation across groups, the top four choices were washing caregivers and IYC hands before/during food preparation and for IYC mealtimes; placing the child on a clean surface; and using clean, dedicated utensils for IYC feeding. For the hardware, a list of all the hardware

items displayed accompanies a photo of the item in a grid along with the approximate cost of the item. Participants voted for the four they felt would be worth their cost. While preferences varied across the groups, a pot with a lid, the bucket with tap, the plastic feeding spoon, and the sippy cup had the most votes (complete listing in Table 17). Finally, the team listed 16 options of specific channels for receiving BCC information with an icon representing each; again, each participant could vote for their top four preferred channels. Home visits and loudspeakers were the top selections, but radio and women's groups (e.g., nurture and care groups) also received many votes (complete listing in Table 18).

**Table 16. Results from dot voting exercises to evaluate preferences for HW and FH behaviors**

| Practice | TA Mpama Influencers | TA Mpama Caregivers | TA Onga Influencers | TA Onga Caregivers | Total |
|---|---|---|---|---|---|
| Washing hands with soap before and during food prep | 5 | 7 | 6 | 4 | 22 |
| Washing caregivers' hands with soap before feeding young one | 6 | 2 | 5 | 6 | 19 |
| Placing child on mat/clean surface while feeding | 7 | 4 | 2 | 2 | 15 |
| Using clean, dedicated utensils for feeding child | 1 | 4 | 3 | 5 | 13 |
| Keeping cleaned, dry utensils at an elevated surface | 3 | 5 | 0 | 4 | 12 |
| Storing spoon off ground between stirs | 4 | 2 | 5 | 1 | 12 |
| Washing child's hands with soap before feeding young one | 3 | 2 | 4 | 2 | 11 |
| Reheating leftover food until you see steam or bubbles | 2 | 1 | 2 | 1 | 6 |
| Covering leftover food being saved to be consumed later | 1 | 2 | 1 | 1 | 5 |
| Cleaning utensils with soap | 0 | 2 | 0 | 2 | 4 |
| Storing foodstuffs on an elevated surface | 1 | 1 | 0 | 1 | 3 |

**Table 17. Results from dot voting exercises to evaluate hardware preferences**

| Hardware | Approx. Cost (K) | TA Mpama Influencers | TA Mpama Caregivers | TA Onga Influencers | TA Onga Caregivers | Total |
|---|---|---|---|---|---|---|
| Small pot w/lid | *4,000* | 6 | 4 | 3 | 6 | 19 |
| 20-L bucket with tap | *5,100* | 7 | 2 | 6 | 3 | 18 |
| Plastic feeding spoon | *150* | 4 | 4 | 6 | 2 | 16 |
| Sippy cup | *2,000* | 4 | 5 | 3 | 2 | 14 |
| Split bamboo mat | *4,000* | 0 | 2 | 6 | 5 | 13 |
| Tippy tap (or leaky tin) | *Cost of materials, e.g., nails* | 0 | 7 | 0 | 2 | 9 |
| Divided plate | *2,230* | 1 | 1 | 4 | 3 | 9 |
| DIY dish drying rack | *Cost of materials, e.g., nails* | 1 | 5 | 0 | 2 | 8 |

| Hardware | Approx. Cost (K) | TA Mpama Influencers | TA Mpama Caregivers | TA Onga Influencers | TA Onga Caregivers | Total |
|---|---|---|---|---|---|---|
| Woven plastic feeding mat | *21,000* | 4 | 1 | 0 | 2 | 7 |
| Wire dish drying rack | *15,000* | 4 | 0 | 0 | 3 | 7 |
| Divided food storage container | *1,000* | 1 | 1 | 0 | 2 | 4 |

**Table 18. Results from dot voting exercises to evaluate BCC approach preferences**

| BCC Approach | TA Mpama Influencers | TA Mpama Caregivers | TA Onga Influencers | TA Onga Caregivers | Total |
|---|---|---|---|---|---|
| Home visit | 7 | 8 | 2 | 7 | 24 |
| Loudspeaker | 4 | 8 | 5 | 5 | 22 |
| Radio | 1 | 3 | 6 | 7 | 17 |
| Mother's care group (or other women only community group) | 4 | 2 | 3 | 5 | 14 |
| Poster | 5 | 4 | 0 | 1 | 10 |
| At the clinic or health center | 2 | 2 | 2 | 1 | 7 |
| Mixed-gender community group (like VSLA) | 2 | 2 | 1 | 1 | 6 |
| SMS | 2 | 1 | 1 | 2 | 6 |
| Leaflet and pamphlet | 1 | 0 | 4 | 1 | 6 |
| Billboard | 0 | 1 | 4 | 0 | 5 |
| At a church or funeral | 1 | 1 | 2 | 1 | 5 |
| At the market | 2 | 0 | 1 | 0 | 3 |
| Information hotline | 0 | 0 | 0 | 1 | 1 |
| At the borehole | 1 | 0 | 0 | 0 | 1 |
| At a football match | 0 | 0 | 1 | 0 | 1 |
| Other (specify) | 0 | 0 | 0 | 0 | 0 |

Ultimately, the co-design steps indicated two lines of larger-ticket hardware products that could potentially facilitate hygienic practices: one class of familiar, low cost, and mostly DIY options that were affordable but not highly desirable ("traditional" hardware); and another set that was higher cost and mostly out of reach for rural households but not so novel that they had never been seen before or were not available in nearby markets ("aspirational" hardware). Spoons and plates were generally lower cost and seen as widely available and participants used them, although some households did not have "dedicated" products only for the IYC; plastic food storage containers and sippy cups were somewhat more aspirational but there was not a large cost difference across different models. Despite participants describing that the traditional items could meet their needs for enacting hygienic complementary feeding practices, the team also knew from household observations that these items were not typically in use in households, so the team worked internally to decide on improvements or alterations when devising the TIPs arms. For example, the team promoted tippy taps previously, but households did not use them widely based on observations, so the team selected an alternative option, a leaky tin (Photo 11), that still had a lower cost than a bucket with tap. The team also worked with World Vision to review the overall budget and cost per item to ensure the interventions trialed in the TIPs phase would be feasible to

implement at a wider scale in the future. Table 19 outlines the adjustments made to the product lineup as the team finalized the TIPs packages.



*Photo 11. Examples of leaky tins installed attached to a bamboo rack (left), freestanding, 3-pole leaky tin design (right)*

**Table 19. Adjustments made to the product line-up following HCD Workshops**

| Confirmed Critical Control Points/Practices (CCPs) | Hardware tested in HCD Workshop | Alterations/Adjustments to hardware and decisions on inclusion in TIPs package |
|---|---|---|
| Store ingredients away from animals (i.e., elevated surface)<br><br>Use clean utensils for handling ingredients (i.e., maize flour) and cooking, including keeping utensils off ground, to prevent contamination<br><br>Use clean utensils for IYC feeding<br><br>Store leftover foods away from animals (i.e., elevated surface) | • Wire rack | • Aspirational arm received wire rack at first visit<br>• Sourced two-tier racks instead of 3-tier for cost savings<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| | • Bamboo drying rack | • Traditional arm received outdoor bamboo rack at first visit<br>• Shifted to a two-tier design based on workshop feedback<br>• Provided an additional indoor bamboo shelf at Day 10 to allow for indoor storage<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| Wash hands with soap during food preparation<br><br>Wash own hands and IYC hands with soap before/during feeding of IYC/ after they touch dirty things | • 20-L bucket with tap | • Aspirational arm received bucket with tap at first visit, a leaky tin at Day 10 visit<br>• No alterations to design<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| | • Tippy tap | • Traditional arm received a leaky tin attached to their outdoor bamboo rack at first visit, a bucket with tap at Day 10<br>• Changed to a leaky tin design* |

| Confirmed Critical Control Points/Practices (CCPs) | Hardware tested in HCD Workshop | Alterations/Adjustments to hardware and decisions on inclusion in TIPs package |
|---|---|---|
| | | • Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| Wash hands with soap during food preparation<br><br>Use clean utensils for handling ingredients (i.e., maize flour) and cooking, including keeping utensils off ground, to prevent contamination<br><br>Wash own hands and IYC hands with soap before/during feeding of IYC/ after they touch dirty things<br><br>Use clean utensils for IYC feeding | • Liquid soap<br><br><br>• Bar soap | • Provided bar soap to both arms at Day 1 and Day 10 visits<br>• Both arms provided instructions and materials to make a soapy water bottle at Day 10<br>• Shifted to a mid-cost bar soap for both arms (Butex) based on preference for a bar soap, but dislike of the brand tested (due to difficulty rinsing)<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| Cover foods while cooling to prevent contamination from pests | • Small pot with lid | • Eliminated from offering as participants indicated they would use it as an extra cooking pot, not for the promoted practice of covering food during cooling<br>• Reinforced importance of practice through BCC poster only (e.g., using existing household supplies like extra plates, pot covers) |
| Feed IYC on a clean surface | • Woven plastic mat | • Aspirational arm received woven plastic mat at first visit<br>• Cut commercially available mats in two and had a tailor restitch seam for cost savings<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| | • Split bamboo mat | • Traditional arm received a Bamboo mat with maize sack topper at first visit<br>• Added a maize sack topper based on concern over bamboo mat pinching IYC<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| Use clean utensils for IYC feeding | • Divided plate | • Both arms received a plastic divided plate AND a plastic flat plate at first visit<br>• Provided two types of plates given relatively low cost and wide availability and desirability aspects of both models<br>• Shifted from melamine plates to plastic to improve durability based on user feedback<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| | • Sippy cup | • Both arms received plastic sippy cup at first visit |

| Confirmed Critical Control Points/Practices (CCPs) | Hardware tested in HCD Workshop | Alterations/Adjustments to hardware and decisions on inclusion in TIPs package |
|---|---|---|
| | | • Shifted to a less expensive, more widely available sippy cup design for cost savings<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| | • Plastic spoon | • Both arms received a plastic spoon at first visit<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| Cover leftover foods | • Divided plastic storage container | • Provided a plastic divided container with lid to both arms at first visit<br>• Sourced opaque/solid color containers based on feedback on desirable product characteristics<br>• Correct use of hardware/importance of practice reinforced through BCC poster and 'owner's manual' |
| Heat ingredients to boiling<br><br>Heat leftover foods to boiling before feeding IYC | • No hardware trialled, as practice was common using existing household supplies | • Reinforced importance of practice through BCC poster only |

\* There was a desire for a low-cost option, but previously promoted tippy taps were not in use (based on observations during field visits). Given this, the study team decided test an alternative option that had a lower cost than bucket with tap.

### 4.2.2    TRIAL OF IMPROVED PRACTICES

In Step 2 of the study, the team identified acceptable and desirable HW and FH products, which the team then piloted in Step 3, the TIPs. This section presents the findings based on the data collected during the TIPs phase. The organization and summaries of these findings are according to the product categories.

#### 4.2.2.1  Participant Baseline Characteristics
The TIPs sample consisted of 56 caregivers (28 in the traditional arm and 28 in the aspirational arm), all of whom were biological mothers of children ages 6-24 months (Table 20). The caregivers had an average age of 29 years, with 10.7 percent having completed junior primary schooling and the remainder having at least a senior primary education. Most caregivers (80.4 percent) were married, while 16.1 percent were divorced. Nearly half (48.2 percent) of the caregivers came from households with a monthly income below K10,000 (approximately US$5.75).

**Table 20. TIPs study sample**

| Primary caregiver for the targeted child | Total (N = 56) |
|---|---|
| Mother | 56 (100.0%) |
| **Mother's age** Mean (SD) | 28.59 (7.31) |
| **Mother's education** | |
| Junior Primary (Std 1-4) | 6 (10.7%) |
| Senior Primary (Std 5-8) | 25 (44.6%) |
| Junior Secondary (Form 1 and 2) | 9 (16.1%) |
| Senior Secondary (Form 3-4) | 14 (25.0%) |
| Higher education- Certificate | 1 (1.8%) |
| Diploma | 1 (1.8%) |
| **Mother's marital status** | |
| Married | 45 (80.4%) |
| Single | 2 (3.6%) |
| Divorced | 9 (16.1%) |
| **Number of household members** Mean (SD) | 4.61 (1.47) |
| **Household earn per month** | |
| Less than K10,000.00 | 27 (48.2%) |
| Between K10,000.00 to K19,000.00 | 11 (19.6%) |
| Between K20,000.00 to K29,000.00 | 7 (12.5%) |
| Between K30,000.00 to K39,000.00 | 2 (3.6%) |
| Between K40,000.00 to K49,000.00 | 3 (5.4%) |
| K50,000.00 and above | 6 (10.7%) |
| **Rooms in your household used for sleeping** | |
| 0 | 1 (1.8%) |
| 1 | 13 (23.2%) |
| 2 | 32 (57.1%) |
| 3 | 8 (14.3%) |
| 4 | 2 (3.6%) |

In terms of housing, only one household did not have a dedicated room for sleeping (Table 21). Approximately 23.2 percent of households had one room for sleeping, while 57.1 percent had two such rooms. Communal boreholes or tube wells were the primary water sources for nearly all households (Table 21). Approximately 78.6 percent had functioning latrines,[7] with 25 percent sharing facilities with non-household members. Pit latrines without a slab were present in 53.6 percent of households, while 23.2 percent had pit latrines with a slab (Table 21).

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[7]  Note here that members of the study team observed pit latrine repairs following Cyclone Freddy in May 2023. These repairs continued for some households into the study timeframe, reflecting the less than 100 percent coverage. Sharing latrines or using those at the local school or mosque were reported as the sanitation strategy for households still undergoing latrine repairs.

**Table 21. Water and sanitation facilities in the households**

| | Total (N = 56) |
|---|---|
| Main source of water at this household | |
|     Borehole or tubewell | 55 (98.2%) |
|     Water from protected spring | 1 (1.8%) |
| Uses of main sources of water* | |
|     Drinking | 53 (94.6%) |
|     Cooking | 50 (89.3%) |
|     Cleaning house | 6 (10.7%) |
|     Cleaning dishes | 29 (51.8%) |
|     Bathing | 38 (67.9%) |
|     HW | 4 (7.1%) |
|     Washing clothes | 36 (64.3%) |
| Functioning toilet present | 44 (78.6%) |
| Share this facility with others who are not members of the household | 14 (25.0%) |
| Type of toilet facility members of household usually use | |
|     Pit latrine with slab | 13 (23.2%) |
|     Pit latrine without slab/open pit | 30 (53.6%) |
|     Twin pit with slab | 1 (1.8%) |

*Indicates multiple responses to the question*

The research team asked caregivers about the availability of products that facilitate HW and FH (Table 22). Approximately 41.1 percent of caregivers reported having at least one HW station at home, but only 3.6 percent had soap available. Around 41.1 percent of households had some type of dish drying facility, with 23.25 percent possessing wire, local, or plastic racks. Other storage methods included basins or crates. Flat plates were present in 71.4 percent of households, compared to only 37.5 percent with divided plates. Sippy cups were available in just 8.9 percent of households, while spoons were prevalent in 80.4 percent, mainly metal ones. Only 3.6 percent of caregivers had narrow-necked covered water storage containers. Additionally, 37.5 percent of caregivers reported owning feeding mats, including sacks (21 percent), split bamboo mats (16.1 percent), and woven plastic mats (1 percent). The remaining 62.5 percent of households did not possess a feeding mat.

**Table 22. Existing HW and FH and storage facilities in the household**

| | Total (N = 56) |
|---|---|
| Number of HW facilities present at the household | |
|     None | 33 (58.9%) |
|     One | 21 (37.5%) |
|     Two | 2 (3.6%) |
| Type of HW facility* | |
|     Tippy tap | 7 (12.5%) |
|     Bucket with a tap | 3 (5.4%) |
|     Jug and basin | 7 (12.5%) |
|     Others | 8 (14.3%) |
| Soap available at the household | 2 (3.6%) |
| Type of soap available | |

| | Total<br>(N = 56) |
|---|---|
| Bar Soap | 2 (3.6%) |
| **Type of dish rack is available at the household** | |
| None | 33 (58.9%) |
| Local (Bamboo) dish rack with single shelf | 2 (3.6%) |
| Local (Bamboo) dish rack with multiple shelves | 1 (1.8%) |
| Wire dish rack with three shelves | 6 (10.7%) |
| Wire dish rack with two shelves | 3 (5.4%) |
| Plastic dish rack with three shelves | 1 (1.8%) |
| Other | 10 (17.9%) |
| Household has a divided plate for child feeding | 21 (37.5%) |
| Household has a non-divided plate for child feeding | 40 (71.4%) |
| Household has a sippy cup for child feeding | 5 (8.9%) |
| Household has a spoon for child feeding | 45 (80.4%) |
| **Type of the spoon** | |
| Plastic spoon | 14 (25.0%) |
| Metal spoon | 31 (55.4%) |
| Household has a water storage container with a narrow neck and that is covered | 2 (3.6%) |
| **Feeding mat available at this household**\*\* | |
| None | 35 (62.5%) |
| *Mphasa* (split bamboo mat) | 9 (16.1%) |
| Sack | 12 (21.4%) |
| *Mkeka* (woven plastic mat) | 1 (1.8%) |

*\*Indicates multiple responses to the question.*

*\*\* Indicates selection multiple responses allowed for specific options.*

### 4.2.2.2  Acceptable and Desirable Combination of HW and FH Products

**a. HW Stations and Practices**

During the baseline assessment, observers asked caregivers about their current HW routines (self-reported). Approximately 80.4 percent indicated consistent HW before food preparation. The majority preferred dipping hands in basin water, while 37.5 percent opted for running water (Table 23). Regarding soap usage, about 62.5 percent stated they typically did not use it, while 33.33 percent did. Similarly, 92.9 percent of caregivers always washed hands before feeding their child. This pattern mirrored HW habits before food preparation, with most using basin water (80.4 percent) and few using soap (10.7 percent).

**Table 23. Percentage of caregivers reporting practice of HW behavior at baseline**

| | Baseline-Day 1<br>(N = 56) |
|---|---|
| Caregivers washing their hands before food preparation | |
| **Consistency of Practice** | |
| Always washes hands before preparing food | 45 (80.4%) |
| Washes hands before preparing food if they see/feel they are 'dirty' | 3 (5.4%) |
| Sometimes washes hands before preparing food | 6 (10.7%) |
| Doesn't wash hands before preparing food | 2 (3.6%) |

| | Baseline-Day 1 (N = 56) |
|---|---|
| **Water used for HW for food preparation*** | |
| Dips hands in basin of water | 43 (76.8%) |
| Running water (pours water over hands using a cup or jug, bucket with a tap) | 21 (37.5%) |
| **Type of soap typically used** | |
| No soap typically used | 35 (62.5%) |
| Ash or sand typically used | 2 (3.6%) |
| Soap typically used (incl. bar soap, liquid soap, soapy water bottle, or other soap) | 19 (33.9%) |
| Caregivers washing their own hands before feeding IYC | |
| **Consistency of practice** | |
| Always washes own hands before feeding IYC | 52 (92.9%) |
| Washes hands before feeding IYC if they see/feel they are 'dirty' | 2 (3.6%) |
| Sometimes washes hands before feeding IYC | 2 (3.6%) |
| Doesn't wash hands before feeding IYC | 1 (1.8%) |
| **Water used for HW for HW for feeding IYC*** | |
| Dips hands in basin of water | 45 (80.4%) |
| Running water (pours water over hands using a cup or jug, bucket with a tap) | 12 (21.4%) |
| **Type of soap typically used** | |
| No soap typically used | 49 (87.5%) |
| Ash or sand typically used | 1 (1.8%) |
| Soap typically used (incl. bar soap, liquid soap, soapy water bottle, or other soap) | 6 (10.7%) |

*Note: *Indicates multiple responses to the question.*

During the Day 1 visit, the team provided participants in the aspirational arm with a bucket with a tap, while participants in the traditional arm received a leaky tin. On Day 10, those who initially received a bucket with a tap received an additional leaky tin, and those who initially received a leaky tin received a bucket with a tap. Therefore, from Day 10 to Day 28 of the study, all participants had both HW models. A higher percentage of caregivers used and preferred bucket with a tap for HW before food preparation and around mealtimes compared to leaky tin by Day 28 (Table 25).

**Table 24. Percentage of caregivers reporting using the provided HW station models to facilitate hand hygiene behaviors on Day 10 and Day 28 visits**

| | Bucket with a Tap | | Leaky Tn | |
|---|---|---|---|---|
| | Day 10 (N = 28) | Day 28 (N = 55) | Day 10 (N = 28) | Day 28 (N = 55) |
| Caregivers washing their hands before food preparation using the provided HW station | 27 (96.4%) | 47 (85.5%) | 28 (100.0%) | 26 (47.3%) |
| Caregivers washing their own hands using provided HW station before feeding their child | 24 (85.7%) | 48 (87.3%) | 24 (85.7%) | 18 (32.7%) |
| Washing IYC's hands using the provided HW station before they eat | 16 (57.1%) | 39 (70.9%) | 15 (53.6%) | 14 (25.5%) |

**Table 25. Preference for HW station models elicited by caregivers for facilitating following hand hygiene behaviors**

|  | Day 28 (N = 55) |
|---|---|
| While preparing food | |
|     Bucket with tap | 45 (81.8%) |
|     Leaky tin | 10 (18.2%) |
| To wash their hands for mealtimes | |
|     Bucket with tap | 46 (83.6%) |
|     Leaky tin | 4 (7.3%) |
|     Something else | 5 (9.1%) |
| To wash their child's hands for mealtimes | |
|     Bucket with tap | 43 (78.2%) |
|     Leaky tin | 4 (7.3%) |
|     Something else | 8 (14.5%) |

Usage: On Day 10, when the leaky tin was the sole option for traditional arm households and the bucket with a tap was the sole option for aspirational arm households, nearly all caregivers used the HW model provided to them (Table 24). However, by Day 28, following the receipt of both HW stations, a greater percentage of caregivers favored the bucket with a tap over the leaky tin. Specifically, 85.5 percent of caregivers reported using the bucket with a tap for HW before food preparation, while only 47.3 percent used the leaky tin. Similarly, 87.3 percent used the bucket with a tap before to wash their hands feeding their child, in contrast to 32.7 percent who used the leaky tin. Moreover, 70 percent of caregivers used the bucket with a tap to cleanse their child's hands before eating, compared to merely 25 percent who used the leaky tin.

Caregivers who did not use using leaky tins for washing hands around mealtime mentioned that they kept these tins away from cooking areas. Additionally, they used the leaky tin for washing hands after using the toilet, so most caregivers did not consider it suitable for hand hygiene around mealtimes. Caregivers considered the process of washing hands with a leaky tin as time consuming.

> *"Leaky tin should be used when coming to toilet, that is why [it is] not used when preparing food."*

Likewise, caregivers who did not use a bucket with a tap during mealtime mentioned reasons such as the bucket being located away from the cooking area or infants and young children playing with the water and getting wet.

Preference: Inquiring about HW model preferences revealed a clear majority favoring the bucket with a tap, especially during mealtime (Table 24). Approximately 81.8 percent of caregivers expressed a preference for the bucket with a tap before food preparation, in contrast to 18.2 percent who favored the leaky tin. Similarly, 83.6 percent and 78.2 percent of caregivers, respectively, preferred the bucket with a tap for washing their own hands before feeding and their child's hands before meals, compared to 7.3 percent who preferred the leaky tin for these purposes. Those who responded with "something else" mostly preferred using a basin with a jug or a cup for HW during mealtimes.

Facilitators and barriers: The caregivers cited remembering and habit formation as key facilitators for using the provided stations, both the bucket with a tap and the leaky tin, for HW behaviors around mealtimes (Annex 2, Tables A2-1 to A2-4). Furthermore, caregivers identified awareness of the benefits, HW station availability, water access, and convenient placement of the HW station as significant facilitators. On the other hand, while many caregivers found no difficulties in using the provided HW stations for these behaviors, non-users of the leaky tin reported inconvenience in using it for cooking. Additionally, participants cited use of leaky tin for post-defecation HW and the time-consuming process of filling and it as significant barriers for using it to wash hands around mealtimes. Similarly, non-users of

the leaky tin mentioned issues such as messiness and water contamination when using it to wash children's hands before meals, due to the lack of covering on the leaky tins.

Changes made to the product: A few caregivers made minor modifications, such as changing the product's location, fixing leaks, and other adjustments to make HW stations easier to use on Day 28. Five caregivers reported making changes to the bucket with a tap, such as placing it on an elevated surface to keep it away from children (n=2) or covering leaks with plastic (n=1). For the leaky tin, a few caregivers made minor adjustments, like shortening the wire attached to it for easier use (n=1) or adding wooden poles to hang it from (n=2). When asked what would make cleaning the HW stations easier, most caregivers mentioned the availability of soap and water, as well as having the motivation to clean them.

*b. Soap*

All participants received a bar of soap on Day 1. On Day 10, the team provided all participants with a soapy bottle. Therefore, from Day 10 to Day 28, all participants had both a bar of soap and a soapy bottle. Caregivers used and preferred the provided soapy water bottle relatively more for hand hygiene activities, whereas they used and preferred the provided bar soap slightly more for cleaning cooking and feeding utensils. Overall use of the provided soap was low for cleaning utensils and washing IYC's hands, mainly due to its depletion and strong smell. Caregivers preferred local soap brands for washing utensils.

**Table 26. Percentage of caregivers reporting using the provided HW soaps to facilitate hand and food hygiene behaviors since the previous visit**

|  | Bar Soap | | Soapy Bottled Water |
|---|---|---|---|
|  | Day 10 (N = 56) | Day 28 (N = 55) | Day 28 (N = 55) |
| Caregivers washing their own hands before food preparation using the provided soap | 53 (94.6%) | 32 (58.2%) | 37 (67.3%) |
| Caregivers washing their own hands using provided soap before feeding their child | 46 (82.1%) | 24 (43.6%) | 32 (58.2%) |
| Caregivers washing their child's hands using the provided soap before they eat | 38 (67.9%) | 22 (40.0%) | 30 (54.5%) |
| Washing cooking pots with provided soap before its use | 15 (26.8%) | 16 (29.1%) | 2 (3.6%) |
| Washing feeding utensils with provided soap after its use | 15 (26.8%) | 17 (30.9%) | 2 (3.6%) |

**Table 27. Preference for products elicited by caregivers for cleaning cooking and feeding utensils\***

|  | Day 28 (N = 55) |
|---|---|
| Bucket with tap | 15 (27.3%) |
| Provided bar soap | 18 (32.7%) |
| Provided soapy water bottle | 3 (5.5%) |
| Something else (specify) | 31 (56.4%) |

*Note: Most participants reporting "something else" preferred azam soap, a basin, or bucket with no tap for cleaning utensils.*
*\*Indicates multiple responses to the question*

Usage: The use of bar soap for hand hygiene declined from Day 10 to Day 28 (Table 26). Initially, the majority of caregivers used bar soap, but with the availability of soapy water bottles, a higher proportion used soapy water bottle by Day 28 for hand hygiene activities. For instance, while 94 percent used bar

soap before food preparation on Day 10, only 58.2 percent did so by Day 28, with 67.3 percent opting for soapy water bottles. Similarly, bar soap usage decreased for washing caregivers' hands before feeding children (from 82.1 percent to 43.6 percent), while soapy water usage was 58.2 percent on Day 28. Likewise, the use of bar soap for washing children's hands dropped from 67.9 percent to 40 percent by Day 28, but soapy water usage was 54.5 percent on Day 28. Limitations on using bar soap for hand hygiene was due to several factors: running out of it, its faster depletion compared to soapy water, its use for making soapy water, and the perception that washing hands with bar soap during meals is time-consuming whereas rinsing hands with soapy water is easier and faster. Additionally, participants cited the soap's strong scent, not feeling the need to wash the child's hands, or simply forgetting to use bar soap as reasons for not using it to wash children's hands before eating. Non-users of the soapy water bottle cited reasons such as its placement away from the cooking area and its use for other purposes, like HW after using the toilet, as reasons for not using it during mealtimes.

*"Soapy water at the bucket is fast to use as they just squeeze the bottle unlike the bar soap which needs to be scrubbed in the hands."*

The overall usage of soap for washing utensils was low. However, the percentage of caregivers reporting the use of bar soap for washing utensils was slightly higher when compared to using the soapy water bottle. For instance, about 30.9 percent of caregivers reported using bar soap for cleaning feeding utensils on Day 28, whereas only 3.6 percent reported using a soapy water bottle. Caregivers who did not use the bar soap or soapy water bottle for cleaning utensils reported that the provided bar soap, which they also used for making soapy water, had a strong smell. They preferred using local brands, such as Azam or Surf for cleaning utensils. Some participants thought that the soapy water was only meant for HW and that diluted soapy water would not clean their utensils.

*"Using soapy water to wash utensils cannot make the utensils clean because the water has less soapy power."*

Preference: When asked about their preferred products for washing utensils (Table 27), 32.7 percent opted for the provided bar soap, while only 5.5 percent favored the provided soapy water. Among those who preferred alternative products, 24 caregivers favored Azam or other local brands of bar soap.

Facilitators and barriers: Remembering to use soap for hand hygiene and utensil cleaning, understanding the benefits of soap, and having an adequate supply of soap were key facilitators for both using bar soaps and soapy water bottle around mealtimes and utensil cleaning (Annex 2, Tables A2-5 to A2-12). Conversely, running out of soap was a significant barrier for both bar soap and soapy water bottles. The strong smell was a barrier to using the soap for washing utensils for both bar soap and soapy water bottles. Moreover, using soapy water bottles for other purposes, such as HW, and insufficient foam in the soapy water were barriers specifically related to not using soapy water bottle for utensil cleaning.

Changes made to the product: Most caregivers did not modify the bar soap or soapy water bottle. However, two caregivers reported enlarging the holes in the soapy water bottle to improve water flow. One caregiver mentioned cutting the bar soap into pieces to make it last longer and placing it in a spot that would remind them to use it for HW or cleaning utensils.

*c. Drying Racks*

Before implementation of the intervention package, the majority of caregivers (76.8 percent) stated they utilized a wash basin for storing cooking and feeding utensils (Table 28). None of the caregivers mentioned using a shelf for this purpose, but approximately one-fourth reported using a rack. Additionally, caregivers also mentioned storing both cooking and feeding utensils on the ground or floor.

**Table 28. Percentage of caregivers reporting practice of storing utensils at the baseline**

| | Baseline- Day 1 (N = 56) |
|---|---|
| **Storage of cooking utensils between uses*** | |
| Store in wash basin | 43 (76.8%) |
| Store on a shelf | 0 (0.0%) |
| Store on a rack | 14 (25.0%) |
| Store on another elevated surface | 18 (32.1%) |
| Store on ground or floor | 18 (32.1%) |
| **Storage of feeding utensils after meal*** | |
| Store in wash basin | 44 (78.6%) |
| Store on a shelf | 0 (0.0%) |
| Store on a rack | 13 (23.2%) |
| Store on another elevated surface | 14 (25.0%) |
| Store on ground or floor | 25 (44.6%) |
| Other | 6 (10.7%) |

*Note: * Indicates multiple responses to the question.*

**Table 29. Percentage of caregivers reported using the provided dish drying racks to facilitate FH behaviors since the previous visit**

| | Traditional arm: Two-tier outdoor bamboo rack | | Aspirational arm: Two-tier wire rack | |
|---|---|---|---|---|
| | Day 10 (N = 28) | Day 28 (N = 27) | Day 10 (N = 28) | Day 28 (N = 28) |
| Storing cooking utensils on dish drying rack | 28 (100.0%) | 21 (77.8%) | 27 (96.4%) | 27 (96.4%) |
| Drying feeding utensils on dish drying rack after the use | 28 (100.0%) | 21 (77.8%) | 27 (96.4%) | 27 (96.4%) |

**Table 30. Preference for products elicited by caregivers for storing containers and food items at elevated platform***

| | Day 28 | |
|---|---|---|
| | Traditional arm: Two-tier outdoor bamboo rack (N = 27) | Aspirational arm: Two-tier wire rack (N = 28) |
| Provided drying rack | 21 (77.8%) | 25 (89.3%) |
| Provided shelf | 25 (92.6%) | 0 (-%) |
| Something else (specify) | 11 (40.7%) | 19 (67.9%) |

*Note: Participants reporting 'something else' preferred baskets, stool, tabletop, and brick/pillar to store utensils*
*\*Indicates multiple responses to the question*

On Day 1 of TIPs, the team provided the traditional arm participants with a bamboo rack, while the aspirational arm received a metal dish rack. By Day 10, the traditional arm additionally obtained a shelf. Consequently, from Day 10 to Day 28, the traditional arm had both a bamboo rack and a shelf, whereas the aspirational arm retained the metal rack. The caregivers who received a two-tier wire rack were more likely to use it to store utensils compared to those in traditional arm who received an outdoor two-tier bamboo rack.

Usage: In the traditional arm, the usage of the outdoor two-tier bamboo rack declined from 100 percent on Day 10 to 77.8 percent on Day 28, while in the aspirational arm, the usage of the metal rack remained constant at 96.4 percent across both visits (Table 29). The caregivers from the traditional arm who reported not using the two-tier bamboo rack cited the placement of the dishrack outside the house and that they feared dust settling on the utensils or utensils getting stolen. Making the bamboo racks movable could increase its use inside the household.

Preference: In the aspirational arm, around 89 percent of caregivers who received a two-tier wire rack preferred it for storing utensils, while in the traditional arm, 77.8 percent preferred the provided two-tier bamboo rack (Table 29). Additionally, caregivers in the traditional arm received an indoor bamboo shelf on Day 10, with about 92.6 percent expressing a preference for it. Most caregivers (70.37 percent) in the traditional arm indicated a preference for both the two-tier bamboo rack and an indoor shelf. Participants reporting 'something else' preferred baskets, stool, tabletop, and brick/pillar to store specific food items or utensils.

Facilitators and barriers: Caregivers cited several facilitators for using the provided dish rack for utensil storage, including remembering to store utensils on it, committing to do so, and understanding the benefits of keeping food items off the ground (Annex 2, Tables A2-13 to A2-16). Additionally, caregivers in the traditional arm, who received an outdoor bamboo rack, mentioned sunny weather and the dish rack's closeness to the kitchen area as facilitators. Some participants also mentioned ways to store small utensils as a facilitator for using wire racks for utensil storage. While almost nothing would make it difficult to use the wire racks, key barriers, especially for bamboo racks, included poor weather conditions and utensils falling through the rack.

Changes made to the product: No caregivers mentioned making significant modifications to the dish drying rack. Most caregivers stated that they cleaned the dish rack with a cloth and water. A few caregivers (n=3) expressed concerns about the risk of injury when cleaning the wire dish rack, while a few others cited being in hurry, the time-consuming nature of the cleaning process, and a lack of motivation as barriers to maintaining the dish rack's cleanliness. Most caregivers did not report any difficulty in cleaning the dishrack.

*d. Feeding Mats*

Before administering the intervention, during the baseline assessment, approximately 35.7 percent of caregivers stated that they always fed their IYC while holding them in their laps. In contrast, only 16.1 percent reported that IYC always ate on a mat, and the same percentage of caregivers mentioned always placing their child on the veranda or floor during feeding.

**Table 31. Percentage of caregivers reporting surfaces used for feeding IYC at the baseline\*\***

|  | Baseline- Day 1 (N = 56) |
|---|---|
| Always eats while held in caregiver's lap | 20 (35.7%) |
| Sometimes eats while held in caregiver's lap | 13 (23.2%) |
| Always eats on a mat (specify type) | 9 (16.1%) |
| Sometimes eats on a mat (specify type) | 7 (12.5%) |
| Always eats on veranda or floor | 9 (16.1%) |
| Sometimes eats on veranda or floor | 9 (16.1%) |
| Other | 5 (8.9%) |

*\*\* Indicates selection multiple responses were allowed for specific options*

**Table 32. Percentage of caregivers reported using the provided feeding mats to facilitate FH behaviors since the previous visit**

| | Traditional arm: Split bamboo mat with maize sack topper (saka) | | Aspirational arm: Imported plastic mat | |
|---|---|---|---|---|
| | Day 10 (N = 28) | Day 28 (N = 27) | Day 10 (N = 28) | Day 28 (N = 28) |
| Placing IYC on the provided feeding mat while they eat | 28 (100.0%) | 27 (100.0%) | 28 (100.0%) | 28 (100.0%) |

**Table 33. Preference for surfaces elicited by caregivers for placing their child while feeding**

| | Day 28 | |
|---|---|---|
| | Traditional arm Split bamboo mat with maize sack topper (N = 27) | Aspirational arm Imported plastic mat (N = 28) |
| Imported mat | 0 (0.0%) | 28 (100.0%) |
| Split bamboo mat with maize sack topper | 20 (74.1%) | 0 (0.0%) |
| Split bamboo mat alone | 5 (18.5%) | 0 (0.0%) |
| Maize sack topper alone | 1 (3.7%) | 0 (0.0%) |
| Somewhere else (specify) | 1 (3.7%) | 0 (0.0%) |

After the intervention delivery, all caregivers used and preferred whichever mat they received in the study.

Usage: On Day 1, the traditional arm received a split bamboo mat with maize sack topper, whereas the aspirational arm received an imported plastic mat (Table 32). All caregivers in both arms used whichever mats they received to place their child on while feeding. All caregivers who used mats in the last 24 hours reported using them primarily to place their child during feeding. Additionally, caregivers utilized mats as feeding surfaces for other children or family members, as play mats or sleeping mats, for drying maize, and as seating surfaces for guests.

Preference: In the aspirational arm, everyone preferred the provided imported plastic mat. In the traditional arm, almost everyone preferred the split bamboo mat with maize sack topper, but there was some variation in preferences (Table 33). Out of 27 caregivers, 20 preferred the split bamboo mat with maize sack topper, five preferred only the split bamboo mat, and one caregiver preferred maize sack topper alone.

Facilitators and barriers: The barriers and facilitators for both the traditional bamboo mat with maize sack topper and the imported plastic mat were similar (Annex 2, Tables A2-17 and A2-18). Caregivers cited remembering to place the child on the mat while feeding, understanding the benefits of using a feeding mat, personal commitment to this behavior, and the mat being clean and not needing repair as key facilitators. Conversely, barriers included the mat was not kept clean, they used it for something else, or caregivers were too busy and forgot to use it as a surface to place the child on during feeding. Most caregivers indicated no difficulties in using these feeding mats.

Changes made to the product: None of the caregivers reported making any changes to the feeding mat. When asked about difficulties in cleaning the mat, most caregivers indicated there were none. However, a few mentioned issues such as the lack of soap or sufficient water, bad weather hindering the drying process, and the mat tearing during cleaning. Caregivers mentioned that their personal commitment and

motivation to maintain a clean mat and provide a healthy environment for their children, along with the availability of soap, facilitated the cleaning of the mat.

### e. Feeding Kit

During the baseline, the team asked caregivers about their existing food storage and child feeding practices (Table 34). Just one caregiver mentioned leaving food uncovered, while all others stated using containers or dishes with either tight or loose covers to store leftovers. The majority (85.7 percent) had flat plates for feeding children, with only 19.6 percent having divided plates. When asked about feeding porridge/*nsima* to IYC, around 80.4 percent mentioned using hands, and 98.2 percent mentioned using spoons sometimes.

**Table 34. Percentage of caregivers using following FH products at baseline**

|  | Baseline- Day 1 (N = 56) |
|---|---|
| **Storage of leftover food*** |  |
| Container/cover used | 3 (5.4%) |
| Container with a tight lid | 31 (55.4%) |
| Pot or plate with a tight cover | 8 (14.3%) |
| Dish/pot with a loose cover | 20 (35.7%) |
| Kept uncovered | 1 (1.8%) |
| Other | 0 (0.0%) |
| **Type of plates/bowls used to serve child*** |  |
| Has a flat plate for feeding the child | 48 (85.7%) |
| Has a divided plate for feeding the child | 11 (19.6%) |
| Other (specify) | 5 (8.9%) |
| **Child is fed foods like porridge/nsima with: ** ** |  |
| Only hands | 0 (0.0%) |
| Sometimes hands | 45 (80.4%) |
| Spoon | 55 (98.2%) |
| Other | 0 (0.0%) |

*\* Indicates multiple responses to the question.*
*\*\* Indicates selection multiple responses was allowed for specific options*

**Table 35. Percentage of caregivers reported using following FH products to facilitate following behaviors since last visit**

|  | Day 10 (N = 56) | Day 28 (N = 55) |
|---|---|---|
| Store leftover food in the provided container | 51 (91.1%) | 53 (96.4%) |
| Using flat plate for serving food to the child | 56 (100.0%) | 55 (100.0%) |
| Using divided plate for serving food to the child | 51 (91.1%) | 53 (96.4%) |
| Feeding IYC with the provided spoon | 55 (98.2%) | 54 (98.2%) |

**Table 36. Preference for products elicited by caregivers for covering leftover food**

|  | Day 28 (N = 55) |
|---|---|
| Provided food storage container | 52 (94.5%) |
| Other (describe) | 3 (5.5%) |

After caregivers received the feeding kit, most used all products in the kit, including the food storage container, plates, and spoon.

Usage: By Day 28, around 96.4 percent of caregivers reported using the provided food storage container for storing leftover food (Table 35). While all caregivers reported using the provided flat plates for serving food to their IYC, about 96.4 percent reported using the provided divided plate for their IYC. Similar, about 98.2 percent of caregivers reported using plastic spoon for feeding the IYC.

Preference: On Day 28, the team asked caregivers about their preferred product for storing leftover food (Table 36). Approximately 94.5 percent indicated a preference for the provided food storage container. The survey did not inquire about preferences for other products in the feeding kit.

Facilitators and barriers: For all the behaviors mentioned above, caregivers mentioned that forming a habit, knowing the benefits and importance of practicing the behavior, and committing to the habit are key facilitators (Annex 2, Tables A2-19 to A2-22). For food storage containers, caregivers mentioned that having clean containers and lids facilitated their use, while noting that containers breaking were a key barrier to storing leftover food. Regarding spoons, participants noted that clean spoons, spoons visible nearby during feeding, and the ease of using the spoon were key facilitators for feeding children. For plates, having a designated storage place was as an additional facilitator, whereas having broken or dirty plates were key barriers.

Changes made to the product: Only a few caregivers mentioned modifying how the items in the feeding kit are stored or used. One caregiver noted keeping the food storage container in plastic to maintain its warmth. Additionally, three caregivers reported placing spoons in specific locations to prevent them from getting lost.

When asked what could make cleaning or maintaining the food storage container, spoons, and plates difficult, most people said nothing would. However, a few mentioned that not having soap would make it challenging. When asked what would help with cleaning these items, caregivers reported that having soap, enough water, and personal commitment or motivation would facilitate the process.

*f. Other FH Behaviors:*

Storing food ingredients safely: During baseline assessments, the team asked caregivers about their current food ingredient storage practices (Table 37). Results showed that 48.2 percent used container with a dedicated lid to cover ingredients, while 32 percent utilized containers with plates or other objects as covers. However, 37.5 percent left food ingredients uncovered. Additionally, while 48.2 percent stored ingredients on elevated surfaces, a significant 73.2 percent also stored some ingredients on the ground.

**Table 37. Percentage of caregivers reporting the following practices to safely store food ingredients at the baseline**

|  | Baseline- Day 1 (N = 56) |
|---|---|
| **Covering food ingredients*** |  |
| In covered containers with dedicated lids | 27 (48.2%) |
| In covered containers covered with plates or other objects | 18 (32.1%) |
| In uncovered containers | 21 (37.5%) |
| Other | 7 (12.5%) |
| **Keeping food ingredients elevated*** |  |
| On an elevated surface | 27 (48.2%) |
| On the ground | 41 (73.2%) |
| Other | 2 (3.6%) |

* *Indicates multiple responses to the question*

**Table 38. Percentage of caregivers reported storing food ingredients safely and elevated since last visit**

|  | Day 10 (N = 56) | Day 28 (N = 55) |
|---|---|---|
| Covering food ingredients | 55 (98.2%) | 54 (98.2%) |
| Keeping food ingredients elevated | 50 (89.3%) | 53 (96.4%) |

During intervention delivery, interviewers described the importance of keeping food ingredients covered and elevated (Table 38). By Day 28, approximately 98.2 percent of caregivers consistently kept food ingredients covered most of the time, while 96.4 percent ensured the elevation of food ingredients either always or sometimes.

Some key facilitators of consistently keeping ingredients covered and elevated included remembering to do so or forming a habit, understanding the benefits of covering and elevating food, and personal commitment (Annex 2, Tables A2-23 and A2-24). Additionally, owning containers with lids or having enough plates to use as lids facilitated covering food, while having a rack or shelf for elevated storage was crucial.

Conversely, most caregivers reported no difficulty in keeping food covered or elevated. However, a few cited forgetting or being too busy as barriers to storing food in this manner. Moreover, not having an elevated surface for this purpose posed a barrier to keeping food at a higher elevation.

**Safely preparing and cooking food:** The team surveyed caregivers regarding their food preparation and cooking practices, with a focus on safety measures such as washing fruits with clean water; cooking food until bubbling and steaming; and preventing contamination from dirt, feces, or animals by elevating or covering the food (Table 39). At the baseline, a substantial majority (94.6 percent) reported always washing fruits with clean water. This practice persisted among 96.4 percent of caregivers throughout the study. Similarly, all caregivers indicated that they always cooked food until it bubbled or steamed, both at the baseline and during subsequent visits.

**Table 39. Percentage of caregivers reported safely preparing and cooking food since last visit**

|  | Day 1 (N = 56) | Day 10 (N = 56) | Day 28 (N = 55) |
|---|---|---|---|
| Washes fruits with clean water | 53 (94.6%) | 54 (96.4%) | 53 (96.4%) |
| Cooks all foods until bubbling or steaming | 56 (100.0%) | 56 (100.0%) | 55 (100.0%) |
| Prevents exposure from dirt, feces, and animals | 25 (44.6%) | 47 (83.9%) | 45 (81.8%) |

The prevention of food exposure to contaminants by elevating and covering it showed a notable improvement following the baseline (including protecting it as it cools) (Table 39). At baseline, only 44.6 percent of caregivers reported always taking measures to shield food from dirt, feces, and animals. After receiving education on the benefits of this precaution, there was a significant increase in the uptake of this practice. By Day 10 post-intervention, approximately 83.9 percent of caregivers reported always preventing such exposure by elevating or covering the food, and this figure remained high at 81.8 percent by Day 28.

Facilitating factors for washing fruits before giving them to IYC included remembering to do so, understanding the benefits, committing to it, having water availability and access to clean water, and having containers to store water (Annex 2, Tables A2-25 to A2-27). While most caregivers did not foresee difficulties, some cited insufficient water, forgetfulness, or being too busy as barriers to washing fruits before feeding them to their IYC. Factors aiding in keeping food safe from contamination encompassed habit formation, awareness of benefits, personal commitment, and having a clean elevated surface. Conversely, barriers included using the surface for other purposes. Nonetheless, most caregivers believed nothing would hinder this practice. Facilitators for cooking food until

steaming/bubbling included fuel availability, preference for the taste of cooked food, habit formation, and awareness of benefits.

**Reheating leftover food before eating:** The team surveyed caregivers on the frequency of reheating leftover food before feeding. Initially, 89.3 percent reported always or sometimes reheating food at the baseline. This percentage increased to 96.4 percent during the Day 10 and Day 28 visits (Table 40). Facilitators of reheating food until steaming/bubbling included a preference for the taste, availability of fuel and firewood, habit formation, and awareness of benefits (Annex 2, Table A2-28). While most said nothing would make it difficult to reheat the leftover food, some reported barriers including a lack of firewood or a lack of time to reheat food before eating.

**Table 40. Percentage of caregivers reported safely reheating leftover food since last visit**

|  | Day 1 (N = 56) | Day 10 (N = 56) | Day 28 (N = 55) |
|---|---|---|---|
| Reheating leftover food until bubbling/steaming | 50 (89.3%) | 54 (96.4%) | 53 (96.4%) |

*4.2.2.3 Acceptable and Desirable Messaging Content and Delivery Channel(s) for HW and FH BCC Messaging.*
Based on the delivery of the BCC materials to households as part of the introduction to the enabling hardware for reference, the team sought feedback on both the delivery mechanism and the content. Most caregivers preferred one-to-one household visits (58.2 percent), followed by phones (36.4 percent), radios (32.7 percent), and group sessions (25.5 percent) (Table 41). Caregivers who favored one-on-one household visit sessions mentioned that such sessions make it easier to grasp the content, particularly for those who cannot read or lack access to phones or radios. Additionally, they find it convenient when the visit takes place in their own home. Those who preferred group sessions emphasized the benefits of collective learning and mutual reminders about hygienic practices. They pointed out that they already participate in group meetings where participants could share such information effectively. Individuals who preferred receiving information via radio highlighted their existing reliance on this medium for information. Meanwhile, participants saw phones as a convenient tool for receiving reminders about hygienic behaviors.

In terms of the BCC content, everyone found the booklet useful, with no one reporting any confusion or missing information, and there were no suggestions for removing any content deemed unnecessary (Table 42). However, there was not a strong response to the use of the poster as a prompt for HW behaviors to take place at critical times. Therefore, the team should further examine appropriate nudges and prompts in the next phase (e.g., messaging and images on handwashing facilities, bracelets).

**Table 41. Preference for information delivery channels**

|  | Total (N = 55) |
|---|---|
| **How would you like to receive the information on HW and FH we provided over the last month?*** |  |
| Poster | 8 (14.5%) |
| Full Booklet | 11 (20.0%) |
| Just the introduction from the booklet | 1 (1.8%) |
| One-on-one household visits | 32 (58.2%) |
| Group sessions | 14 (25.5%) |
| Radio | 12 (21.8%) |
| Phone | 20 (36.4%) |
| Mobile Van | 2(3.6%) |
| Clinics | 1(1.8%) |

*Note: * Indicates multiple responses to the question.*

**Table 42. Caregiver's feedback on the user manual booklet content**

| | Total (N = 55) |
|---|---|
| Did you find the booklet we provided useful? | |
|     Yes | 55 (100.0%) |
| Anything in the booklet you found confusing? | |
|     No | 55 (100.0%) |
| Was any information missing in the booklet? | |
|     No | 55 (100.0%) |
| Is there any information you felt was not needed in the booklet and can be removed? | |
|     No | 55 (100.0%) |

### 4.2.2.4  Summary of TIPs Findings

The findings from the TIPs on various hygiene intervention components, including HW station models, soap, dish drying racks, feeding mats, feeding kits, and other FH behaviors, offer valuable insights into the preferences, usage patterns, facilitators, and barriers experienced by caregivers in the study sample. While in some cases the aspirational product was more preferred and used than a traditional product, there were generally improvements seen in practices for both types of products. In terms of HW station models, the TIPs highlight a clear preference for the bucket with a tap over the leaky tin, particularly during mealtime HW. Evidence of this preference is the higher percentage of caregivers using the bucket with a tap for HW before food preparation and feeding the IYC compared to the leaky tin by Day 28. Placement of the HW station, such as having the bucket with a tap closer to the cooking or feeding area, emerged as a crucial factor in facilitating HW behaviors during mealtime. Perception of the leaky tin was that it was more suitable for placement outside the latrine, leading caregivers to use it after defecation rather than around mealtimes.

Soap usage remained relatively low both at baseline and throughout the TIPs. As study participants used the provided soap for multiple activities such as HW and washing utensils, they quickly depleted it, leaving most caregivers without soap for performing hand hygiene behaviors or washing utensils by Day 28. Among the provided soap types, the TIPs highlighted a preference for the provided soapy water bottle for hand hygiene activities, while the provided bar soap was slightly more used and preferred for cleaning utensils. However, the strong smell of the provided soap and soapy water bottle emerged as a key barrier to its use for washing utensils, leading caregivers to prefer local soap brands for cleaning utensils.

Regarding dish racks, caregivers who received a two-tier wire rack were more likely to use it than those who received a traditional bamboo rack. Concerns emerged during the study visits about outdoor placement of traditional bamboo racks, such as poor weather limiting use or damaging the product, dust settling, or stolen utensils. A clear preference for feeding mat type did not emerge from the TIPs. Participants used both types, imported plastic and bamboo mats with maize sack topper, and caregivers preferred them equally depending on which they received. Similarly, participants used the feeding kit, including a food storage container, plates, cup, and spoon.

The BCC materials, including poster and owner's manual were well received by caregivers and may have contributed to the trends seen in practice of FH behaviors that were not hardware dependent—such as the improvement in protecting foodstuffs from contamination during food preparation and more consistency in reheating foods to a boil. When asked about future preferences, one-to-one household visits were the most preferred, followed by mediums such as phones, radios, and loudspeakers for sharing hygiene and FH information.

## 5.0 LIMITATIONS

The intention of the formative research study activities was to inform the design of a potential next phase in the same district. While these results contribute to the limited body of literature related to layered HW and FH hardware and BCC interventions, the results of these study activities are only directly generalizable to the study context.

In the TIPs, the study primarily focused on defining an acceptable and feasible package of enabling hardware and BCC; some aspects of the intervention package included in TIPs, such as the delivery mechanism, may not be feasible within a real-world setting. HSAs and other community-level staff employed by the Government of Malawi may not have the capacity to deliver content in this manner.

As with all research that relies primarily on self-reported data, there is the risk of self-reporting bias. For example, TIPs respondents largely selected household visits as their preferred BCC channel, but this may reflect courtesy bias given that the data collectors also implemented the BCC aspects of the study during their household visits. The research team attempted to mitigate response bias by not informing households until the end of the study that they would be able to keep the HW and FH hardware used during the TIPs period.

# 6.0   DISCUSSION AND CONCLUSIONS

In Chiradzulu Malawi, the study confirmed that food preparation practices—including washing hands with soap before food preparation, use of hygienic utensils, and safe storage of ingredients' and leftover food—and child feeding practices—including washing hands with soap before feeding, feeding location, and use of clean utensils—are critical control points for safe feeding of IYC within rural households. Using these points as a guide the study identified locally available products that could facilitate HW and FH practices and used a TIPs study design to test two hardware packages (traditional and aspirational) to address these critical control points. The TIPs demonstrated that while some of the aspirational products were preferred and used more than a traditional product, there were generally improvements seen in HW and FH practices for both types of products. While no suitable, locally available standalone product to cover food while cooling was identified, the practice was promoted in the BCC materials and reported practices to prevent food exposure to dirt, feces, and animals while cooling improved from about 44 percent at baseline to over 80 percent by Day 28, reportedly by using materials already available in the household. Table 43 outlines the products and BCC approaches considered in the study, their cost, high-level findings, and considerations for potential follow-up study.

**Table 43. Summary of TIPs findings and implications for follow-up**

| Practice | Product | Local cost Kwacha (inclusive of labor) | TIPs Findings | Implications for Follow-up |
|---|---|---|---|---|
| HW | Bucket with tap | 5100 | • Utilized more than leaky tins for HW at mealtimes/ meal preparation<br>• Placing bucket near cooking or feeding areas facilitated use during meal preparation | • Ensuring that households have HW facilities in two locations may be advantageous<br>• Making instructions on construction of leaky tins or other DIY HW devices available to ensure even ultra poor households have access to an appropriate option |
| | Leaky tin | 800 | • Perceived as more suitable for use after latrine | |
| Washing hands and utensils with soap | Bar soaps | 645 | • Low utilization over time<br>• Ran out by Day 28<br>• Disliked strong smell for washing utensils | • Caregivers preferred local soap brands for cleaning utensils over lemon scented option<br>• Offering of multiple soap types to meet all household uses (including bathing, laundry) may increase likelihood of soap use for HW/FH<br>• Questions remained on appropriate BCC to address barriers to long-term use and continued soap purchase/replacement |
| | Soapy water bottle | 200 | • Preferred for HW to ensure bar soap lasts longer<br>• Perceived as too diluted for washing utensils<br>• Smell remained barrier | |
| Safe storage of foodstuffs | Two-tier wire rack | 7000 | • Higher reported use than among bamboo rack users | • Both racks used by their owners, although utilization of wire rack was higher |

| Practice | Product | Local cost Kwacha (inclusive of labor) | TIPs Findings | Implications for Follow-up |
|---|---|---|---|---|
| and clean utensils | Bamboo rack | 7000 | • Lower reported use than among wire rack users, but improved over baseline<br>• Concerns about outdoor placement (weather, dust, theft) | • Indoor shelf received favorable feedback and had minimal cost, so could consider for inclusion in any follow-up design regardless of drying rack selected<br>• Could make instructions on construction of bamboo racks and/or shelves available to ensure even ultra poor households have access to an appropriate option |
| | Indoor shelf | 1000 | • Widely used among those who received | |
| | Plastic divided container | 1000 | • Widely used during TIPs | |
| Hygienic feeding practices | Woven plastic mat | 11000 | • Widely used among those who received | • A clear preference for feeding mat type did not emerge from the TIPs, with both types having high utilization by those who received them |
| | Bamboo mat with maize sack topper | 4400 | • Widely used among those who received | |
| | Plastic spoon | 150 | • Widely used during TIPs | • Participants accepted products well |
| | Plastic cup | 450 | • Widely used during TIPs | |
| | Plastic divided plate | 450 | • Widely used during TIPs | |
| | Plastic flat plate | 450 | • Widely used during TIPs | |
| BCC | Food safety poster | -- | • Well received by caregivers | • Print materials used in TIPs study were well-received among households |
| | Owner's manual | -- | • Well received by caregivers | • Should incorporate evidence from LSHTM trial into future BCC materials and activities in the area<br>• Should consider participant preferences for interpersonal communication, phone communications and group counseling as potential channels<br>• Future research should integrate study materials with existing BCC activities in study area |

Overall, the findings suggest that the introduction of hardware (e.g., HW stations and FH hardware) and choice architecture within the home environment can minimize the need for more resource-intensive BCC. This hypothesis could be tested in an efficacy study to examine the impacts of minimal versus more intensive BCC alongside the introduction of hardware. However, one challenge faced in the study concerns the lack of sustained use of soap for washing hands. While many households indicated they had run out of the provided bar soap by Day 28, barriers to the use of soap for washing utensils and

handwashing during food preparation and IYC feeding were also documented at Day 10, indicating that supply alone did not explain low utilization.

While the study found that both aspirational and traditional items were accepted by households in the study area and appeared to facilitate behavior change, further evidence is necessary to demonstrate if this type of intervention package is feasible and effective. Furthermore, the sustainability of these products and behaviors within households, including the durability of the DIY products, needs to be assessed. WASH and nutrition programs would benefit from evidence on the factors that facilitate or prohibit longer term use of these products. Especially in a market-based setting, these findings also point to a potential benefit of multiple types of products being available, so families can select a DIY or traditional enabling hardware product based on their budget and priorities, while having the option to move up the "ladder" to a more aspirational product as they are able and motivated to do so (e.g., after harvest season when they have more cash on hand). For example, about a quarter of the households had a wire rack, so this may be something that families can realistically save up for. Additionally, offering different types of soap in a market setting to meet different household needs/at different price points may also be a viable strategy for shops selling such products. More evidence also is necessary to demonstrate applicability to additional contexts beyond Chiradzulu, Malawi. Additionally, our data indicate that additional exploration is necessary to identify optimal, yet cost-effective, BCC strategies that target key determinants of HW behaviors prior to food preparation and feeding which appear to be different than the determinants that drive HW behaviors following latrine use. For instance, based on our literature review, disgust is a motivating factor for HW post latrine use but did not emerge in our research for HW behaviors prior to food preparation and feeding. However, more research is necessary to understand the nuances in how motivating factors may differ across these different critical times for HW.

Potential follow-on studies can build on the key findings from this formative research, to generate additional evidence that may inform scale-up of including enabling hardware for HW and FH into broader WASH and nutrition programming. In the context of Chiradzulu, WASHPaLS #2 intends to conduct a  follow-on efficacy trial to addressing the following research questions:

- What is the effect of the HW and FH hardware and relative role of BCC messaging within the broader intervention package, on caregivers' performance of HW and FH behaviors around complementary food preparation and consumption by IYC?

- What is the effect of the HW and FH hardware and relative role of BCC messaging within the broader intervention package, on reported diarrhea incidence among IYC?

Likely designed as a three-arm trial built around provision of the hardware package identified in this formative study, the trial will also provide an opportunity to discern impact of varying levels of intensity of BCC on behavioral practices.

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# ANNEX 1. DETAILED METHODOLOGY

## OBJECTIVE 1

*Data Collection Methods*

The WASHPaLS #2 research team addressed Objective 1 using focus group discussions (FGDs) complemented by observations of food preparation/feeding within households of infants and young children (IYCs), and in-depth interviews (IDIs) with primary caregivers and influencers of IYCs. The team trained four data collectors fluent in Chichewa and English who carried out data collection, accompanied by a field supervisor.

The FGD used a video vignette to anchor the discussion, as video vignettes allow for increased engagement of FGD participants compared to written vignettes or regular FGDs (Chen, Hsu, and L. Pearce 2022). The video vignette used a hypothetical case of a woman who was not observant of all recommended hygiene practices when cooking, feeding, storing, reheating, and cooling food for her young child. The video also covered the handling of dishes. The risky practices depicted in the video aligned with those found in the Chikwawa Hazard Analysis and Critical Control Points (HACCP). After watching each scene of the video, interviewers asked participants questions to elicit their perceptions about the extent to which the woman's behaviors were common in Chiradzulu. Participants were each issued three cards with pictorial representations to indicate if they perceived the practice as very common, somewhat common, or rare/not at all common (Figure A1-1).
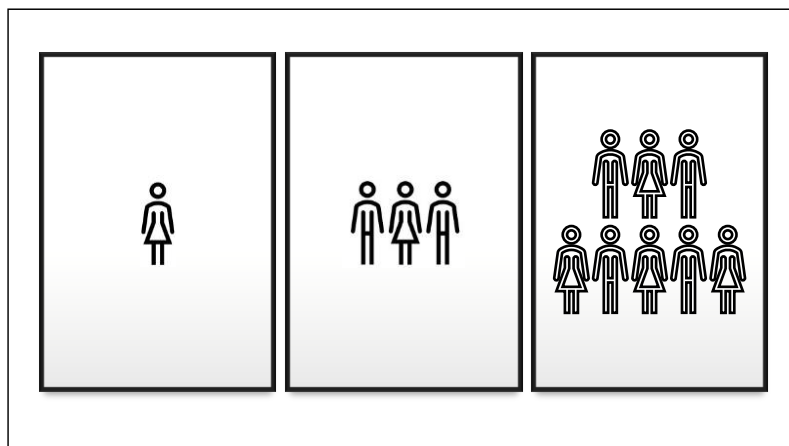


**Figure A1-1. Pictorial representations for FGD participants to indicate perception of the practice as rare/not at all common, somewhat common, or very common**

Topics generally covered each critical control point of the HACCP flow diagram (Figure A1-2) (i.e., storage, cooking, cooling, reheating, feeding) and included:

- Commonalities and differences between the woman featured in the video's approach to cooking for and feeding the child versus what most people do in the community; and
- Recommendations from the participants about any adjustments to the woman's behaviors to better protect the child's health and the support they would need to perform the ideal behaviors at these critical control points.

Prior to the IDIs with caregivers, a data collector visited the household to conduct structured observations around handwashing (HW) and food hygiene (FH) practices. During household observations, the interviewers made notes about observations of minors in the household but did not interact directly with any minors. The data collectors conducted IDIs with caregivers and household

influencers in the same households where the observations took place and aimed to elucidate further insight into behavioral determinants of HW and FH practices described as typical or atypical in the FGDs and observed earlier in the day. They explored behavioral determinants of HW and FH using a semi-structured, theory-based elicitation discussion guide[8]. Examples of data collected in the IDIs included attitudes and feelings toward washing hands with soap and engaging in recommended FH behaviors, as well as perceived barriers to and facilitators of these behaviors.
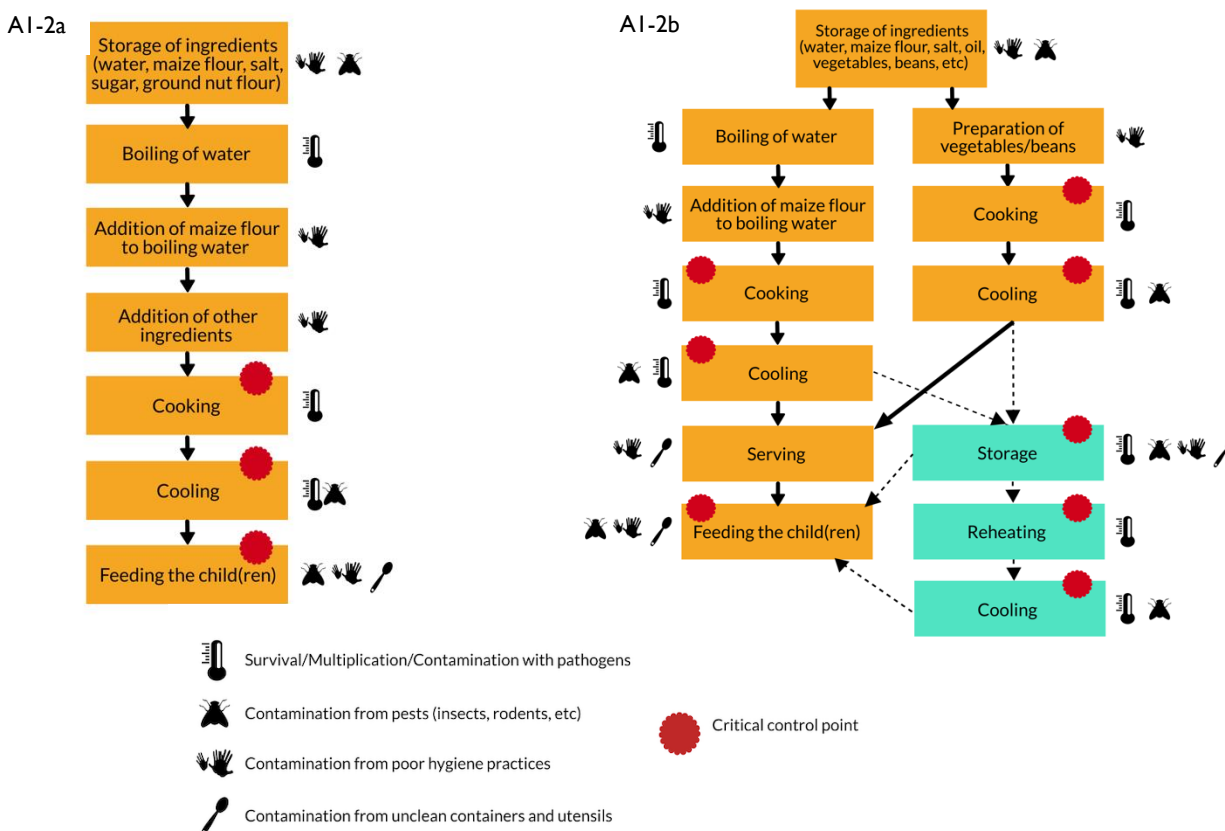


**Figure A1-2. Flow diagram[9] of porridge preparation and feeding (A1-2a) and *nsima* and relish preparation, storage, and feeding (A1-2b) based on the HACCP conducted in Chikwawa (Chidziwisano et al. 2019).** Solid lines indicate pathways for food preparation and immediate consumption, while dashed lines indicate possible pathways for food if stored for later consumption.

*Sample Size*

Interviewers conducted the FGDs to validate the HACCP with 64 participants divided across eight FGDs; with four FGDs conducted per TA: one each with caregivers and influencers of IYC ages 6-11 months and 12-23 months. The intent of the stratification was to capture norms and practices for HW and feeding with younger infants who the caregiver fed versus older infants who were more likely to be self-feeding. The target sample size for each was eight participants. Sample size was guided by previous

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[8]    Data collection instruments can be accessed in the Study Inception Report (USAID WASHPaLS #2 Project 2023a).

[9]    These HACCP flow diagrams outline the critical control points for the two main complementary foods being provided to IYC: (1) maize-based porridge and (2) *nsima* (maize) and relish (vegetables/meat). In terms of porridge (A1-2a), critical control points were identified as: cooking to adequate temperature (i.e., 75 °C+); cooling should be achieved quickly, and food should not be accessed by animals or flies. Children should be fed with clean utensils after the caregiver washed her/his hands with soap. Critical control points for *nsima* and relish (A1-2b) were similar to porridge (i.e., cooking, cooling, and feeding the child). Furthermore, since the *nsima* and relish are stored to be eaten during the next meal, the additional critical control points included safe storage of food (controlled storage time and temperature; food must be covered) and reheating (up to boiling) before consumption.

research indicating saturation was normally reached within two to four homogenous groups with at least eight participants each (Guest, Namey, and McKenna 2016). For observations and IDIs, the team recruited eight caregivers and eight influencers per TA. The team again stratified the sample based on IYC age brackets: 6–11 months and 12–23 months. Methodological research has found a minimum of six interviews for a given set of participant characteristics (e.g., age, gender) has been demonstrated to be enough to reach saturation when conducting in-depth interviews (Guest, Bunce, and Johnson 2006).

*Data Analysis*

Stage 1. Familiarization: The lead analyst from FHI 360 and co-investigators reviewed initial data received for quality assurance purposes, to familiarize themselves with the content, and to assess signs of saturation as the research process proceeded. This team held discussions as needed to identify areas for improvement in interviewer/facilitation techniques and documentation/transcription quality and note emergent themes they should add to codebooks.

Stage 2. Identifying themes: Initial codebook development occurred prior to data collection and linked closely to the interview/discussion guides (structural codes) and the research objectives (thematic codes), with codes identified *a priori*. The team assessed these codes during review of initial transcripts to look for redundancy, refine definitions, and identify example segments. Investigators added additional codes to capture emergent themes both during familiarization and throughout the coding process. Investigators organized the codebook around the critical control points of food preparation, storage, and feeding identified for the Chikwawa HACCP (Figure A1-2).

Stages 3-4. Indexing & Charting: The lead analyst developed a coding schedule that specified coding assignments and deadlines and created an Excel matrix and annotation template that allowed staff from the data collection firm to participate in indexing without access to licensed qualitative data analysis software. The two individual coders downloaded and saved a copy of the matrix to their personal OneDrive or to local file storage and input text segments into the template and utilized the annotations to indicate facilitators, motivators, and barriers to practices. Upon initial receipt of transcripts and debriefing forms from each type of discussion (meaning primary caregiver and influencer groups), the assigned coders independently read and coded one debriefing form using the established codebook and coding definitions. Coders then held an intercoder agreement assessment to compare application of codes and agree on any changes or additions to the codes or definitions. The coders then corrected data according to the consensus coding. Coders made no significant changes to the codebook. As indexing occurred in Excel, it streamlined the charting step; coders utilized a column for each theme and subtheme (i.e., code and subcode), and a row to represent each FGD.

Stage 5. Interpretation/Mapping: Using the charting and summarization matrices, the lead analyst further reduced the findings to develop tallies for described norms for each food and hand hygiene behavior and summarized overarching barriers, motivators, and facilitators to practice.

For IDIs and observations, given the available timeline for iteration between data capture and conducting FGDs with product fairs, investigators rapidly synthesized data with the data collection team to iterate and refine the intervention package within the project timeline. Step 2, including data collection, debriefings, and synthesis took place over approximately a two- to three-week period. To facilitate rapid analysis, the data collectors and note takers used structured debriefing forms completed in English to document the discussions and their notes on the sessions. Where possible, activities utilized tallies to allow for aggregating responses, while allowing participants to discuss their choices and the factors they consider when making choices.

**OBJECTIVE 2**

*Data Collection Methods*

For the first step toward addressing Objective 2—co-designing a HW and FH intervention package—the research team built on the findings from Objective 1 and utilized human centered design (HCD) approaches to formative research. HCD is a framework that engages stakeholders directly in a process of co-designing solutions or products by directly involving them in defining criteria of desirability (what people want or need), feasibility (what already exists/is available), and viability (what people can purchase/obtain), often through an iterative process using feedback and prototypes (Burton et al. 2021).

Specifically, the team began the co-design process with a series of product fairs with supplementary FGDs (termed here "hybrid FGDs"). Based on the critical control points that emerged from Objective 1 and the range of products available in the TAs and Blantyre, they assembled sets of enabling hardware products that could facilitate hygienic practices, namely: drying racks, HW devices, feeding mats, feeding utensils (i.e., spoons, plates, cups), and food covers (i.e., storage containers, pot covers/lids).

The product fairs sought to engage participants through direct interactions with HW and FH hardware and used interactive data collection methods to gather information on the participant's perceptions on usability, feasibility and desirability of the products (Morse, Tilley, et al. 2020). For the product fair, displays were set up in the vicinity of the hybrid FGD venue to present participants with a selection of HW and FH products. "Vendors" invited participants to browse through the display to take a close look at the products and ask any questions about the product. Data collectors stationed within the market took written notes of interactions with the products using dedicated data collection forms. At the end of the display visit, vendors presented participants with pictures of all the products displayed at the product fair and asked them to take a printed photo of one product they liked the most per category of product (i.e., one picture of a preferred HW station, one picture of a type of storage container, one picture of a dishrack). After the product fair, participants took the set of photos of their preferred products to the FGD room where the facilitator noted the number of participants who picked each product and conducted a discussion around the products chosen by participants.

A FGD followed the product fairs to discuss the products displayed at the fair. To minimize potential biases from influencers' influence on caregivers, interviewers held separate FGDs for each category of respondents. Interviewers also gave participants the opportunity to make recommendations for potential improvements. Examples of topics included reasons for choosing the product, how they compare to other products shown in the market, the most/least appealing attributes of the products, ease of use or not, and suggestions for improvements. Following the hybrid FGDs, investigators analyzed the data rapidly using detailed notes taken on thematic templates to identify components of the FH and HW hardware components and the BCC messaging strategy to use in the HCD community workshops.

Given the iterative nature of HCD approaches, the workshops followed a similar format, but the team conducted them with a different group of caregivers and household influencers and focused on a narrower range of products and any improvements needed to the hardware and BCC approaches to increase their acceptability, feasibility, and desirability. Participants were again able to interact with and use the hardware, and then interviewers asked a series of questions about their experience with the products. Questions aimed to understand how participants would use the products, elicit perceptions about the products (feelings, barriers and facilitators, and others), and obtain recommendations from participants for minor adjustments/ improvements. The workshop also gathered participant's perceptions, preferences, and recommendations for strengthening the content and delivery approach of the BCC messaging.

*Data Analysis*

To iterate and refine the intervention package within the project timeline, investigators conducted rapid data analysis. As for the IDIs in Objective 1, the data collectors and note takers for the hybrid FGDs and

the HCD workshop used English-language structured debriefing forms and notes and tallies to aggregate responses when possible.

During the product fair portion of the hybrid FGDs, data collectors took notes for each product type on reactions or questions as they related to acceptability of using the product, desirability of using the product, affordability of using the product, and feasibility of using the product. Investigators further summarized considerations around these domains based on the debriefing forms from the discussion portions of the hybrid FGDs to eliminate products perceived as less desirable, acceptable, feasible, or affordable. Debriefing forms from the HCD workshops provided additional context around these domains, as well as recommendations for changes that could improve the hardware products to make them more desirable, acceptable, etc.

*Trial of Improved Practices (TIPs)*
The TIPs methodology is a participatory approach that allows end users to pilot intervention candidates or prototypes in a real-world scenario and provide recommendations and feedback before scaling up. In the context of WASH interventions, TIPs has been used to design HW stations, potties for child feces disposal, and baby play spaces (Simiyu et al. 2020). Collaborating with World Vision, the research team utilized the outcomes of Step 2 to design the subsequent iteration of the intervention package (comprising FH and HW products along with BCC messages), which underwent piloting using a TIPs framework (Step 3). Figure A1-3 shows the hardware components piloted within the TIPs framework. For the BCC components, feedback from Step 2 on preferred mediums for receiving BCC messaging were integrated with previous learning from BCC approaches used in the Hygienic Family Trial and Water Sustainable Point of use Treatment Technologies (WaterSPOUTT) projects based within the Risks, Attitudes, Norms, Abilities, and Self-Regulation methodology (Mosler 2012; Morse, Luwe, et al. 2020; Morse, Tilley, et al. 2020). Figure A1-4 shows the poster developed for the TIPs. Overall, the BCC content and delivery mechanisms:

- Utilized tried and tested successful and acceptable images and content from previous hygiene trials conducted in southern Malawi. This included embedding positive and nurturing motives.
- Maximized the use of images to ensure access of the guidance and information to those with low literacy.
- Utilized preferred methods of delivery highlighted in Step 2, also shown to be successful in previous trials (i.e., household-level introduction, materials to support remembering and support habit formation).

For the purposes of addressing the second component of Objective 2, the team documented users' experiences with the provided hardware, focusing particularly on acceptability and desirability in fostering desired behavioral changes over time. The team also gathered recommendations for minor enhancements to both the hardware and the content and delivery channels of BCC messaging.

*Sample Size*

TIPs comprised a total sample of 56 households. The team implemented two TIPs study arms: the traditional arm (n=28 households) in TA Onga and the aspirational arm (n=28 households) in TA Mpama. Both arms received the same BCC, child feeding kit, and soap. The traditional arm received a set of enabling hardware products made with readily available materials at the household and the aspirational arm received products available for purchase in local markets (Figure A1-3). Each study arm had equal number of households with children ages 6–11 months and 12–23 months. In households with two or more IYCs fitting the study criteria, the team selected the youngest IYC as the "index" child to reference in questions about recall of practice (e.g., use of child feeding mat). The primary caregiver from each household served as the main respondent for these surveys.

*Data Collection Methods*

The team implemented TIPs over a 28-day period and study activities spanned four visits conducted to the same households over the four weeks. The team selected households purposively, based on having an appropriately aged child in the household; the data collection team also made efforts to recruit families with varying wealth levels, distance to water source, and households with disability. The team trained data collectors to both collect data and deliver the BCC and hardware elements of the intervention. Table A1-1 summarizes sequencing of data collection visits.

### Day 0 [Baseline]

During this baseline visit, data collectors obtained consent from all household heads and caregivers of the 56 purposively selected households to take part in subsequent TIPs visits. Data collectors informed recruited participants of the schedule for upcoming visits. Additionally, they gathered data regarding the socio-demographic characteristics of the caregivers and existing FH and HW-related behaviors and products from the households.

### Day 1

During the Day 1 visit, the team delivered HW and FH products. The "traditional" arm received an outdoor rack with an attached leaky tin HW device (Figure A1-3), and a split bamboo mat with a maize sack topper. The "aspirational" arm received a two-tier wire rack, a bucket with a tap (Figure A1-3), and a woven plastic mat. Both arms received bar soap, a child feeding kit (plastic spoon, plastic plates, food storage container). Participants in both arms also received BCC messages on the usage of provided products. Data collectors delivered BCC messages through a facilitated home visit using an owner's manual and a poster detailing the 13 steps of the food preparation journey as seen in Figure A1-4. BCC messages targeted all household members present and willing to participate at the time of the visit (Day 1). After the delivery of the BCC message on each step, data collectors then conducted an interview with participants (caregivers) to get immediate feedback on the intervention package, including factors that encourage or discourage use of these products for HW and FH behaviors, facilitators, barriers, and individuals who would support or deter them from practicing these behaviors. After the Day 1 discussions, data collectors left the manual and poster at the household for future reference.
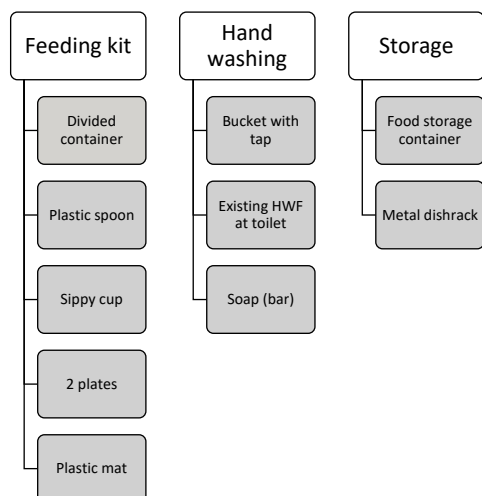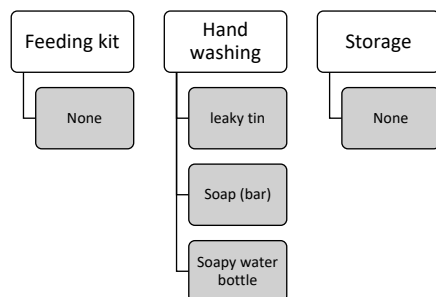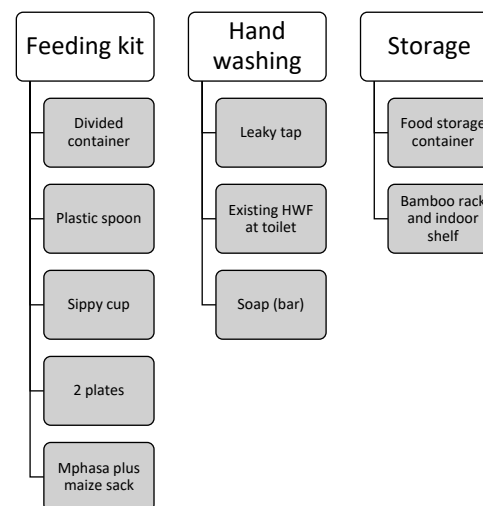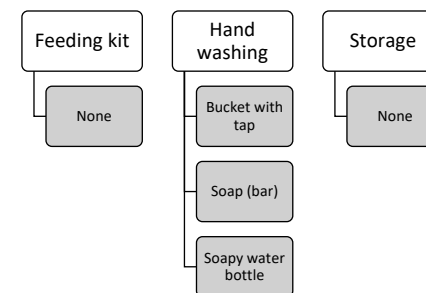
**Figure A1-3. Aspirational and traditional arms of TIPs study**

# Ndondomeko 13 za ulendo wa kadyetsedwe ka mwana moyenera

**1**
Sungani zipangizo zanu mosamala

**2**
Poyambirira, onesetsani kuti m'manja mwanu ndi moyera posamba m'manja ndi sopo

**3**
Onetsetsani kuti ziwiya ndi zoyera musanagwiritse ntchito

**4**
Kozani chakudya mosamala

**5**
Phikani chakudya mosamala mpaka chiwire

**6**
Gawani chakudya mosamala

**7**
Sungani chakudya mosamala pamene chikuzizira musanadye

**8**
Sambani m'manja musanadye

**9**
Dyetsani mwana pa malo aukhondo

**10**
Idyani chakudya pogwiritsa ntchito ziwiya zoyera

**11**
Sungani zakudya zotsara mu kotena yovundikira bwino

**12**
Tenthetsani chakudya chotsala mpaka chiwire bwino

**13**
Tsukani ziwiya ndi sopo ndikusunga mosamala mpaka zitagwiritsidwa ntchito

**Figure A1-4. Poster depicting 13 steps on the "Safe Feeding Journey." Adapted from the Hygienic Family Trial and WaterSPOUTT projects (Mosler 2012; Morse, Luwe, et al. 2020; Morse, Tilley, et al. 2020).**

*Photo A-1. HW stations provided during TIPs Day 1 visit. Bucket with tap—
shown with stand constructed by household members (left), split bamboo rack
built with attached leaky tin (right)*

## Day 10

Data collectors distributed additional HW and FH products and explained them during this visit. The traditional arm received a bucket with a tap and an indoor bamboo shelf (Photo A-2), and the aspirational arm received a freestanding leaky tin installed at a location of their choice. Both arms also received a soapy water bottle and an additional bar soap. The study team also wished to test if an additional HW station in the home would further improve HW and FH behaviors; therefore, mid-way through the TIPs study, the team distributed the leaky tin to households that initially received the bucket with a tap and distributed the bucket with a tap to households that initially



*Photo A-2. Indoor shelf provided to traditional arm at TIPs Day 10 visit*

received the leaky tin. This also enabled the research team to gain insights on both HW devices from all households in the TIPs study.

Data collectors documented the use of products and the adoption of recommended behaviors in caregivers' routines since the Day 1 visit. Additionally, like Day 1, the team collected data on factors influencing these behaviors, facilitators, barriers, and individuals supporting or deterring them. Data collectors conducted spot checks to record the condition and location of the provided products. Furthermore, they conducted a 24-hour recall to capture critical times during which the recommended behaviors were practiced and the purposes for which the provided products were used.

## Day 28

They team provided no additional hardware at this stage. Data collectors reiterated questions from the Day 10 visit. Additionally, data collectors included a new set of questions aimed at gathering final remarks from caregivers regarding their preference for the recommended products.

**Table A1-1. Data collection schedule**

| | Baseline | Day 1 | Day 10 | Day 28 |
|---|---|---|---|---|
| Demographics | Yes | | | |
| Existing FH and HW practices and products | Yes | Yes | | |
| Elicitation questions (barriers, facilitators, motivators, etc.) regarding the recommended FH and HW behaviors | | Yes | Yes | Yes |
| Practice of recommended behavior and use of provided products | | | Yes | Yes |
| Observation of condition and location of provided products | | | Yes | Yes |
| 24-hour recall of recommended behaviors and provided product use | | | Yes | Yes |
| Final remarks about recommended behaviors and provided products | | | | Yes |

*Data Analysis*

1. Analysis of participant baseline characteristics: The team summarized baseline characteristics of the analysis population in tabular form. These measures encompassed various aspects, including attributes of the target child (such as age and gender), socio-demographic characteristics of the primary caregiver (like age, marital status, and education), and household specifics (including total household members, monthly income, as well as the availability of water and sanitation facilities, and existing HW and FH products within the household). The summary included descriptive statistics, including the number and percentage of participants in each category for categorical variables and the number of participants, means, and standard deviation for continuous variables.

2. Acceptable and desirable combination of HW and FH products in Chiradzulu: Behavioral theories such as the Fogg Behavioral Model posited that sustained uptake of a behavior required that it was feasible (i.e., people had the ability to practice it—including that it was accepted/allowed and accessible/affordable) and desirable (i.e., people were motivated/wanted to do it or were encouraged to do it). Enabling technology/hardware & SBC/BCC could facilitate the behavior (i.e., serve as a trigger or prompt) and could itself be feasible and/or desirable to use/access (Fogg 2009).

To establish an acceptable and desirable combination of HW and FH products, the study approach involved analyzing data for each provided product to gather insights into its usage, barriers, and facilitators to product usage, any modifications made to enhance its effectiveness, and preferences regarding product types. The team refined the intervention package based on participant use patterns and preferences, utilizing the identified barriers and facilitators to inform potential BCC strategies to support use.

*Usage of the provided product*: The team conducted a descriptive analysis for each provided product to summarize the number and percentage of users, referring to caregivers who frequently used the product (always or sometimes) since the last visit to facilitate suggested hygiene behaviors, as well as non-users, encompassing those who rarely used the provided product, utilized a different product, or did not use any product since the last visit to enable the suggested hygiene behaviors. A rapid thematic analysis of qualitative responses summarized the reasons provided by the caregivers for not using the provided product to facilitate recommended hygiene behaviors. The team summarized reported factors that aided or hindered the use of the provided product for the recommended hygiene behaviors, disaggregated by users and non-users, including characterizing reasons as primarily related to the feasibility or desirability of the product/behavior.

Data collectors gathered data concerning product usage during visits on Days 10 and 28, and collected information regarding barriers and facilitators to product usage during visits on Days 1, 10, and 28. Coders presented bivariate descriptive analyses with disaggregation by visits.

*Preferences for types of HW stations, soap, mats, food storage container, and dish drying racks*: On the Day 28 visit, data collectors surveyed all households regarding their preferences for products to facilitate the recommended hygiene behavior. For instance, data collectors asked whether participants preferred a bucket with a tap, a leaky tin, or any other type of HW station for washing hands before food preparation and at mealtime. Data collectors asked similar questions regarding dish racks, food storage containers, and feeding mats to elicit caregivers' preferences. A descriptive table summarized the product preferences reported by the caregivers on Day 28.

*Changes made to the provided products to make it easier to use, clean, and maintain (i.e., feasibility)*: Data collectors gathered feedback regarding the modifications made to the products to make them easier to use and clean through open-ended questions during visits on Days 10 and 28. A rapid thematic analysis of these qualitative responses reported the findings for each provided product.

3. Acceptable and desirable messaging content and delivery channel(s) for HW and FH BCC messaging: In the social and behavioral change (SBC) toolkit, each household received a booklet and a poster outlining healthy behaviors along the complementary food pathway. The booklet provided a summarized description of healthy FH and HW behaviors, while the poster presented an illustrated version of this information. On Day 28, data collectors gathered caregiver feedback on this SBC toolkit, including feedback on the usefulness of the booklet, any aspects of the booklet that were particularly confusing or missing, and any information they felt was unnecessary. Additionally, data collectors asked caregivers about their preferred delivery channels for receiving information on HW and FH in the future. The data collectors provided a simple description of these questions, and the team summarized any qualitative data associated with these questions using a rapid thematic analysis.

TIMELINE

**Table A1-2. Study timeline**

|  | Nov 2023 | Dec 2023 | Jan 2024 | Feb 2024 | Mar 2024 | Apr 2024 | May 2024 |
|---|---|---|---|---|---|---|---|
| FGDs with vignettes | X | X |  |  |  |  |  |
| IDIs with observations |  |  | X |  |  |  |  |
| FGDs with product fairs |  |  | X |  |  |  |  |
| HCD workshops |  |  | X | X |  |  |  |
| TIPs |  |  |  |  | X | X |  |
| Interpretation & Reporting |  |  |  |  |  |  | X |

For Objective 1, initial study training and pretesting of FGDs occurred between November 20-22, 2023. The team carried out FGDs November 24–December 8, 2023. A refresher training for the observations and IDIs took place from January 17–19, 2024, with pretesting activities on January 20, 2024. Fieldwork took place January 22–24, 2024.

For Objective 2, the team conducted training on the hybrid fair methodology January 17–19; fieldwork took place immediately following the IDIs, on January 24–26, 2024. A refresher training took place for the FGD workshops on January 29, 2024, followed by fieldwork on January 30–February 3, 2024. Including data collection, debriefings, and synthesis, the process for Objective 2 took place over approximately three weeks.

TIPs was implemented over a 28-day period and study activities spanned four visits conducted to the same households over the four weeks. Initial training on the TIPs methodology took place on February 19, 2024, followed by pre-testing with five households from TA Chitera and household selection and baseline (or Day 0) data collection. Additional training on Day 1, Day 10, and Day 28 procedures took place from February 23-29, 2024. An additional Day 28 refresher session took place on April 8, 2024.

# ANNEX 2. DESCRIPTIVE TABLES

**Table A2-1. Barriers and facilitators to using <u>bucket with a tap</u> for HW before food preparation**

|  | Day 1 <br><br> (N = 28) | Day 10: <br> Non-user <br> (N = 1) | Day 10: <br> User <br> (N = 27) | Day 28: <br> Non-user <br> (N = 8) | Day 28: <br> User <br> (N = 47) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 8 (28.6%) | 0 (0.0%) | 12 (44.4%) | 6 (75.0%) | 33 (70.2%) |
| Knowing the benefits/importance | 6 (21.4%) | 0 (0.0%) | 9 (33.3%) | 1 (12.5%) | 30 (63.8%) |
| Personal commitment/initiative | 3 (10.7%) | 0 (0.0%) | 7 (25.9%) | 1 (12.5%) | 14 (29.8%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) | 1 (12.5%) | 2 (4.3%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having utensils/HW device available | 9 (32.1%) | 0 (0.0%) | 11 (40.7%) | 3 (37.5%) | 27 (57.4%) |
| Having water available | 9 (32.1%) | 0 (0.0%) | 4 (14.8%) | 2 (25.0%) | 16 (34.0%) |
| The location where I wash my hands is convenient | 9 (32.1%) | 0 (0.0%) | 3 (11.1%) | 1 (12.5%) | 13 (27.7%) |
| Other | 0 (0.0%) | 1 (100.0%) | 0 (0.0%) | 1 (12.5%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 15 (53.6%) | 0 (0.0%) | 19 (70.4%) | 3 (37.5%) | 28 (59.6%) |
| Not being motivated | 2 (7.1%) | 0 (0.0%) | 1 (3.7%) | 1 (12.5%) | 3 (6.4%) |
| Forgetting | 6 (21.4%) | 0 (0.0%) | 3 (11.1%) | 0 (0.0%) | 5 (10.6%) |
| Being too busy to use | 2 (7.1%) | 0 (0.0%) | 5 (18.5%) | 0 (0.0%) | 3 (6.4%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy to get water | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 5 (10.6%) |
| Not having enough water | 3 (10.7%) | 0 (0.0%) | 2 (7.4%) | 0 (0.0%) | 7 (14.9%) |
| HWF being used for something else | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (2.1%) |
| HWF being broken | 4 (14.3%) | 1 (100.0%) | 2 (7.4%) | 1 (12.5%) | 8 (17.0%) |
| HWF will make a mess | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| HWF will be inconvenient to use while cooking | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) | 2 (25.0%) | 3 (6.4%) |
| Other | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (25.0%) | 1 (2.1%) |

**Table A2-2. Barriers and facilitators to using <u>bucket with a tap</u> for washing child's hands before feeding their child**

| | Day 1 (N = 28) | Day 10: Non-user (N = 12) | Day 10: User (N = 16) | Day 28: Non-user (N = 16) | Day 28: User (N = 39) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 9 (32.1%) | 2 (16.7%) | 6 (37.5%) | 10 (62.5%) | 25 (64.1%) |
| Knowing the benefits/importance | 7 (25.0%) | 2 (16.7%) | 6 (37.5%) | 5 (31.2%) | 26 (66.7%) |
| Personal commitment/initiative | 0 (0.0%) | 4 (33.3%) | 4 (25.0%) | 4 (25.0%) | 11 (28.2%) |
| Being encouraged | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (5.1%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (12.5%) | 0 (0.0%) |
| Having utensils/HW device available | 12 (42.9%) | 3 (25.0%) | 9 (56.2%) | 3 (18.8%) | 24 (61.5%) |
| Having water available | 5 (17.9%) | 3 (25.0%) | 4 (25.0%) | 4 (25.0%) | 20 (51.3%) |
| The location where I wash my hands is convenient | 7 (25.0%) | 1 (8.3%) | 1 (6.2%) | 5 (31.2%) | 10 (25.6%) |
| Other | 0 (0.0%) | 2 (16.7%) | 0 (0.0%) | 1 (6.2%) | 1 (2.6%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 15 (53.6%) | 3 (25.0%) | 10 (62.5%) | 3 (18.8%) | 25 (64.1%) |
| Not being motivated | 0 (0.0%) | 0 (0.0%) | 1 (6.2%) | 0 (0.0%) | 1 (2.6%) |
| Forgetting | 2 (7.1%) | 2 (16.7%) | 0 (0.0%) | 1 (6.2%) | 2 (5.1%) |
| Being too busy to use | 5 (17.9%) | 0 (0.0%) | 0 (0.0%) | 1 (6.2%) | 1 (2.6%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 1 (8.3%) | 0 (0.0%) | 1 (6.2%) | 0 (0.0%) |
| Being too busy to get water | 0 (0.0%) | 0 (0.0%) | 1 (6.2%) | 0 (0.0%) | 3 (7.7%) |
| Not having enough water | 3 (10.7%) | 0 (0.0%) | 1 (6.2%) | 0 (0.0%) | 8 (20.5%) |
| HWF being used for something else | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| HWF being broken | 3 (10.7%) | 1 (8.3%) | 2 (12.5%) | 2 (12.5%) | 8 (20.5%) |
| HWF will make a mess | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (12.5%) | 1 (2.6%) |
| HWF will be inconvenient to use while cooking | 1 (3.6%) | 0 (0.0%) | 1 (6.2%) | 2 (12.5%) | 1 (2.6%) |
| Other | 0 (0.0%) | 6 (50.0%) | 2 (12.5%) | 7 (43.8%) | 0 (0.0%) |

**Table A2-3. Barriers and facilitators to using <u>leaky tin</u> for HW before food preparation**

| | Day 1 (N = 56) | Day 10: User (N = 28) | Day 28: Non-user (N = 29) | Day 28: User (N = 26) |
|---|---|---|---|---|
| **Facilitators** | | | | |
| Remembering/having it become habit | 6 (21.4%) | 14 (50.0%) | 16 (55.2%) | 19 (73.1%) |
| Knowing the benefits/importance | 14 (50.0%) | 19 (67.9%) | 12 (41.4%) | 13 (50.0%) |
| Personal commitment/initiative | 4 (14.3%) | 11 (39.3%) | 9 (31.0%) | 8 (30.8%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 2 (6.9%) | 1 (3.8%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | 0 (0.0%) | 2 (7.1%) | 4 (13.8%) | 1 (3.8%) |
| Having utensils/HW device available | 6 (21.4%) | 9 (32.1%) | 11 (37.9%) | 16 (61.5%) |
| Having water available | 6 (21.4%) | 6 (21.4%) | 6 (20.7%) | 11 (42.3%) |
| The location where I wash my hands is convenient | 11 (39.3%) | 4 (14.3%) | 8 (27.6%) | 9 (34.6%) |
| Other | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | |
| Nothing would make it difficult | 21 (75.0%) | 16 (57.1%) | 6 (20.7%) | 12 (46.2%) |
| Not being motivated | 0 (0.0%) | 2 (7.1%) | 1 (3.4%) | 3 (11.5%) |
| Forgetting | 1 (3.6%) | 6 (21.4%) | 2 (6.9%) | 3 (11.5%) |
| Being too busy to use | 3 (10.7%) | 7 (25.0%) | 5 (17.2%) | 2 (7.7%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy to get water | 1 (3.6%) | 2 (7.1%) | 4 (13.8%) | 4 (15.4%) |
| Not having enough water | 1 (3.6%) | 1 (3.6%) | 1 (3.4%) | 7 (26.9%) |
| HWF being used for something else | 0 (0.0%) | 0 (0.0%) | 5 (17.2%) | 1 (3.8%) |
| HWF being broken | 1 (3.6%) | 4 (14.3%) | 3 (10.3%) | 4 (15.4%) |
| HWF will make a mess | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (3.8%) |
| HWF will be inconvenient to use while cooking | 0 (0.0%) | 0 (0.0%) | 8 (27.6%) | 2 (7.7%) |
| Other | 1 (3.6%) | 3 (10.7%) | 6 (20.7%) | 1 (3.8%) |

**Table A2-4. Barriers and facilitators to using <u>leaky tin</u> for washing child's hands before feeding their child**

| | Day 1 (N = 56) | Day 10: Non-user (N = 13) | Day 10: User (N = 15) | Day 28: Non-user (N = 41) | Day 28: User (N = 14) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 9 (32.1%) | 5 (38.5%) | 13 (86.7%) | 16 (39.0%) | 9 (64.3%) |
| Knowing the benefits/importance | 14 (50.0%) | 6 (46.2%) | 7 (46.7%) | 23 (56.1%) | 9 (64.3%) |
| Personal commitment/initiative | 3 (10.7%) | 5 (38.5%) | 8 (53.3%) | 9 (22.0%) | 4 (28.6%) |
| Being encouraged | 0 (0.0%) | 1 (7.7%) | 0 (0.0%) | 3 (7.3%) | 0 (0.0%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | 0 (0.0%) | 1 (7.7%) | 0 (0.0%) | 5 (12.2%) | 0 (0.0%) |
| Having utensils/HW device available | 5 (17.9%) | 5 (38.5%) | 6 (40.0%) | 13 (31.7%) | 8 (57.1%) |
| Having water available | 7 (25.0%) | 4 (30.8%) | 2 (13.3%) | 12 (29.3%) | 8 (57.1%) |
| The location where I wash my hands is convenient | 5 (17.9%) | 2 (15.4%) | 0 (0.0%) | 9 (22.0%) | 5 (35.7%) |
| Other | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 3 (7.3%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 16 (57.1%) | 2 (15.4%) | 9 (60.0%) | 7 (17.1%) | 6 (42.9%) |
| Not being motivated | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (2.4%) | 0 (0.0%) |
| Forgetting | 5 (17.9%) | 1 (7.7%) | 2 (13.3%) | 1 (2.4%) | 1 (7.1%) |
| Being too busy to use | 2 (7.1%) | 1 (7.7%) | 2 (13.3%) | 5 (12.2%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 4 (30.8%) | 0 (0.0%) | 5 (12.2%) | 0 (0.0%) |
| Being too busy to get water | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 4 (28.6%) |
| Not having enough water | 3 (10.7%) | 1 (7.7%) | 1 (6.7%) | 1 (2.4%) | 4 (28.6%) |
| HWF being used for something else | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 4 (9.7%) | 0 (0.0%) |
| HWF being broken | 2 (7.1%) | 1 (7.7%) | 1 (6.7%) | 8 (19.5%) | 2 (14.3%) |
| HWF will make a mess | 0 (0.0%) | 6 (46.2%) | 1 (6.7%) | 9 (22.0%) | 3 (21.4%) |
| HWF will be inconvenient to use while feeding | 0 (0.0%) | 3 (23.1%) | 0 (0.0%) | 8 (19.5%) | 0 (0.0%) |
| Other | 0 (0.0%) | 4 (30.8%) | 2 (13.3%) | 14 (34.1%) | 1 (7.1%) |

**Table A2-5. Barriers and facilitators to using <u>bar soap</u> for HW before food preparation**

| | Day 1 (N = 56) | Day 10: Non-user (N = 3) | Day 10: User (N = 53) | Day 28: Non-user (N = 23) | Day 28: User (N = 32) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 13 (23.2%) | 2 (66.7%) | 18 (34.0%) | 3 (13.0%) | 21 (65.6%) |
| Knowing the benefits/importance | 23 (41.1%) | 0 (0.0%) | 24 (45.3%) | 12 (52.2%) | 17 (53.1%) |
| Personal commitment/initiative | 5 (8.9%) | 1 (33.3%) | 17 (32.1%) | 3 (13.0%) | 5 (15.6%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) | 1 (4.3%) | 2 (6.2%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (4.3%) | 1 (3.1%) |
| Having soap available | 28 (50.0%) | 1 (33.3%) | 30 (56.6%) | 17 (73.9%) | 21 (65.6%) |
| The location where I wash my hands is convenient | 5 (8.9%) | 0 (0.0%) | 2 (3.8%) | 1 (4.3%) | 4 (12.5%) |
| Other | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 25 (44.6%) | 2 (66.7%) | 28 (52.8%) | 7 (30.4%) | 13 (40.6%) |
| Not being motivated | 2 (3.6%) | 0 (0.0%) | 2 (3.8%) | 1 (4.3%) | 1 (3.1%) |
| Forgetting | 4 (7.1%) | 0 (0.0%) | 6 (11.3%) | 0 (0.0%) | 1 (3.1%) |
| Being too busy | 2 (3.6%) | 1 (33.3%) | 6 (11.3%) | 1 (4.3%) | 2 (6.2%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (3.1%) |
| Running out of soap | 24 (42.9%) | 0 (0.0%) | 16 (30.2%) | 13 (56.5%) | 16 (50.0%) |
| Soap being used for another purpose | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) | 3 (13.0%) | 1 (3.1%) |
| Someone stealing soap | 0 (0.0%) | 0 (0.0%) | 6 (11.3%) | 0 (0.0%) | 3 (9.4%) |
| Not liking the smell of the soap | 2 (3.6%) | 0 (0.0%) | 4 (7.5%) | 1 (4.3%) | 1 (3.1%) |
| Soap not rinsing off | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (8.7%) | 0 (0.0%) |
| Soap irritating hands | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other (specify) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (4.3%) | 0 (0.0%) |

**Table A2-6. Barriers and facilitators to using <u>bar soap</u> for or washing child's hands before feeding their child**

| | Day 1<br>(N = 56) | Day 10:<br>Non-user<br>(N = 18) | Day 10:<br>User<br>(N = 38) | Day 28:<br>Non-user<br>(N = 33) | Day 28:<br>User<br>(N = 22) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 17 (30.4%) | 3 (16.7%) | 21 (55.3%) | 11 (33.3%) | 12 (54.5%) |
| Knowing the benefits/importance | 23 (41.1%) | 8 (44.4%) | 17 (44.7%) | 21 (63.6%) | 15 (68.2%) |
| Personal commitment/initiative | 3 (5.4%) | 6 (33.3%) | 14 (36.8%) | 4 (12.1%) | 3 (13.6%) |
| Being encouraged | 0 (0.0%) | 1 (5.6%) | 0 (0.0%) | 2 (6.1%) | 1 (4.5%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | 0 (0.0%) | 3 (16.7%) | 0 (0.0%) | 2 (6.1%) | 0 (0.0%) |
| Having soap available | 24 (42.9%) | 9 (50.0%) | 17 (44.7%) | 21 (63.6%) | 14 (63.6%) |
| The location where I wash my hands is convenient | 4 (7.1%) | 1 (5.6%) | 3 (7.9%) | 1 (3.0%) | 2 (9.1%) |
| Other | 0 (0.0%) | 1 (5.6%) | 0 (0.0%) | 2 (6.1%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 27 (48.2%) | 4 (22.2%) | 18 (47.4%) | 6 (18.2%) | 8 (36.4%) |
| Not being motivated | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (6.1%) | 1 (4.5%) |
| Forgetting | 8 (14.3%) | 4 (22.2%) | 3 (7.9%) | 2 (6.1%) | 1 (4.5%) |
| Being too busy | 4 (7.1%) | 1 (5.6%) | 1 (2.6%) | 2 (6.1%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 1 (5.6%) | 0 (0.0%) | 1 (3.0%) | 2 (9.1%) |
| Running out of soap | 17 (30.4%) | 5 (27.8%) | 14 (36.8%) | 14 (42.4%) | 11 (50.0%) |
| Soap being used for another purpose | 0 (0.0%) | 1 (5.6%) | 0 (0.0%) | 3 (9.1%) | 2 (9.1%) |
| Someone stealing soap | 0 (0.0%) | 0 (0.0%) | 1 (2.6%) | 1 (3.0%) | 2 (9.1%) |
| Not liking the smell of the soap | 1 (1.8%) | 4 (22.2%) | 4 (10.5%) | 5 (15.2%) | 3 (13.6%) |
| Soap not rinsing off | 0 (0.0%) | 2 (11.1%) | 1 (2.6%) | 1 (3.0%) | 1 (4.5%) |
| Soap irritating hands | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 0 (0.0%) | 1 (5.6%) | 1 (2.6%) | 2 (6.1%) | 2 (9.1%) |

**Table A2-7. Barriers and facilitators to using <u>bar soap</u> for or washing cooking pots with provided soap before its use**

| | Day 1 (N = 56) | Day 10: Non-user (N = 41) | Day 10: User (N = 15) | Day 28: Non-user (N = 39) | Day 28: User (N = 16) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 20 (35.7%) | 11 (26.8%) | 5 (33.3%) | 8 (20.5%) | 6 (37.5%) |
| Knowing the benefits/importance | 23 (41.1%) | 19 (46.3%) | 8 (53.3%) | 25 (64.1%) | 10 (62.5%) |
| Personal commitment/initiative | 4 (7.1%) | 9 (22.0%) | 3 (20.0%) | 6 (15.4%) | 2 (12.5%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 5 (12.8%) | 0 (0.0%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having water | 2 (3.6%) | 3 (7.3%) | 2 (13.3%) | 3 (7.7%) | 0 (0.0%) |
| Having enough soap | 31 (55.4%) | 21 (51.2%) | 8 (53.3%) | 24 (61.5%) | 13 (81.2%) |
| Having a basin | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having the time to do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 0 (0.0%) | 2 (4.9%) | 2 (13.3%) | 1 (2.6%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing makes it difficult | 26 (46.4%) | 14 (34.1%) | 7 (46.7%) | 4 (10.3%) | 4 (25.0%) |
| Not being motivated | 0 (0.0%) | 1 (2.4%) | 0 (0.0%) | 1 (2.6%) | 0 (0.0%) |
| Forgetting | 1 (1.8%) | 2 (4.9%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | 2 (3.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Preferring the current way I am doing it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Not having water | 0 (0.0%) | 0 (0.0%) | 1 (6.7%) | 1 (2.6%) | 0 (0.0%) |
| Not having soap | 26 (46.4%) | 16 (39.0%) | 5 (33.3%) | 19 (48.7%) | 10 (62.5%) |
| Not having a basin | 1 (1.8%) | 1 (2.4%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Soap is stolen | 0 (0.0%) | 1 (2.4%) | 1 (6.7%) | 0 (0.0%) | 1 (6.2%) |
| Soap is used for other purposes | 1 (1.8%) | 3 (7.3%) | 0 (0.0%) | 7 (17.9%) | 0 (0.0%) |
| Irritates hands | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Smells/tastes bad | 2 (3.6%) | 15 (36.6%) | 6 (40.0%) | 20 (51.3%) | 2 (12.5%) |
| Damages dishes/pots | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other [specify] | 0 (0.0%) | 1 (2.4%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |

**Table A2-8. Barriers and facilitators to using <u>bar soap</u> for or washing feeding utensils with provided soap after its use**

| | | Day 10:<br>Non-user<br>(N = 41) | Day 10:<br>User<br>(N = 15) | Day 28:<br>Non-user<br>(N = 38) | Day 28:<br>User<br>(N = 17) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | | 15 (36.6%) | 5 (33.3%) | 15 (39.5%) | 9 (52.9%) |
| Knowing the benefits/importance | | 23 (56.1%) | 9 (60.0%) | 26 (68.4%) | 13 (76.5%) |
| Personal commitment/initiative | | 11 (26.8%) | 2 (13.3%) | 4 (10.5%) | 3 (17.6%) |
| Being encouraged | | 0 (0.0%) | 0 (0.0%) | 5 (13.2%) | 0 (0.0%) |
| Seeing other people do this | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having water | | 3 (7.3%) | 1 (6.7%) | 2 (5.3%) | 0 (0.0%) |
| Having enough soap | | 16 (39.0%) | 7 (46.7%) | 21 (55.3%) | 11 (64.7%) |
| Having a basin | | 1 (2.4%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having the time to do this | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other (specify) | | 0 (0.0%) | 1 (6.7%) | 1 (2.6%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing makes it difficult | | 18 (43.9%) | 6 (40.0%) | 9 (23.7%) | 6 (35.3%) |
| Not being motivated | | 1 (2.4%) | 0 (0.0%) | 1 (2.6%) | 0 (0.0%) |
| Forgetting | | 2 (4.9%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Preferring the current way I am doing it | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Not having water | | 0 (0.0%) | 1 (6.7%) | 2 (5.3%) | 0 (0.0%) |
| Not having soap | | 13 (31.7%) | 5 (33.3%) | 11 (28.9%) | 10 (58.8%) |
| Not having a basin | | 2 (4.9%) | 0 (0.0%) | 0 (0.0%) | 1 (5.9%) |
| Soap is stolen | | 2 (4.9%) | 1 (6.7%) | 1 (2.6%) | 1 (5.9%) |
| Soap is used for other purposes | | 0 (0.0%) | 0 (0.0%) | 5 (13.2%) | 0 (0.0%) |
| Irritates hands | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Smells/tastes bad | | 11 (26.8%) | 7 (46.7%) | 18 (47.4%) | 1 (5.9%) |
| Damages dishes/pots | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other [specify] | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |

**Table A2-9. Barriers and facilitators to using <u>soapy water bottle</u> for HW before food preparation**

| | | Day 28: Non- user (N = 18) | Day 28: User (N = 37) |
|---|---|---|---|
| **Facilitators** | | | |
| Remembering/having it become habit | | 9 (50.0%) | 16 (43.2%) |
| Knowing the benefits/importance | | 5 (27.8%) | 25 (67.6%) |
| Personal commitment/initiative | | 1 (5.6%) | 8 (21.6%) |
| Being encouraged | | 1 (5.6%) | 1 (2.7%) |
| Seeing other people do this | | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | | 1 (5.6%) | 0 (0.0%) |
| Having soap available | | 9 (50.0%) | 27 (73.0%) |
| The location where I wash my hands is convenient | | 4 (22.2%) | 3 (8.1%) |
| Other | | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | |
| Nothing would make it difficult | | 4 (22.2%) | 17 (45.9%) |
| Not being motivated | | 2 (11.1%) | 2 (5.4%) |
| Forgetting | | 2 (11.1%) | 1 (2.7%) |
| Being too busy | | 0 (0.0%) | 1 (2.7%) |
| Being discouraged by others/others disapprove | | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | | 1 (5.6%) | 0 (0.0%) |
| Running out of soap | | 5 (27.8%) | 19 (51.4%) |
| Soap being used for another purpose | | 2 (11.1%) | 0 (0.0%) |
| Someone stealing soap | | 1 (5.6%) | 2 (5.4%) |
| Not liking the smell of the soap | | 0 (0.0%) | 0 (0.0%) |
| Soap not rinsing off | | 0 (0.0%) | 0 (0.0%) |
| Soap irritating hands | | 0 (0.0%) | 0 (0.0%) |
| Other (specify) | | 4 (22.2%) | 1 (2.7%) |

**Table A2-10. Barriers and facilitators to using <u>soapy water bottle</u> for or washing child's hands before feeding their child**

| | | Day 28: Non- user (N = 25) | Day 28: User (N = 30) |
|---|---|---|---|
| **Facilitators** | | | |
| Remembering/having it become habit | | 9 (36.0%) | 14 (46.7%) |
| Knowing the benefits/importance | | 15 (60.0%) | 19 (63.3%) |
| Personal commitment/initiative | | 4 (16.0%) | 6 (20.0%) |
| Being encouraged | | 2 (8.0%) | 0 (0.0%) |
| Seeing other people do this | | 0 (0.0%) | 0 (0.0%) |
| Having time/not being hurried | | 1 (4.0%) | 0 (0.0%) |
| Having soap available | | 14 (56.0%) | 21 (70.0%) |
| The location where I wash my hands is convenient | | 1 (4.0%) | 4 (13.3%) |
| Other | | 2 (8.0%) | 0 (0.0%) |
| **Barriers** | | | |
| Nothing would make it difficult | | 4 (16.0%) | 13 (43.3%) |
| Not being motivated | | 3 (12.0%) | 1 (3.3%) |
| Forgetting | | 3 (12.0%) | 0 (0.0%) |
| Being too busy | | 3 (12.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | | 4 (16.0%) | 0 (0.0%) |
| Running out of soap | | 10 (40.0%) | 15 (50.0%) |
| Soap being used for another purpose | | 1 (4.0%) | 0 (0.0%) |
| Someone stealing soap | | 1 (4.0%) | 1 (3.3%) |
| Not liking the smell of the soap | | 6 (24.0%) | 0 (0.0%) |
| Soap not rinsing off | | 1 (4.0%) | 0 (0.0%) |
| Soap irritating hands | | 0 (0.0%) | 0 (0.0%) |
| Other | | 3 (12.0%) | 2 (6.7%) |

**Table A2-11. Barriers and facilitators to using <u>soapy water bottle</u> for or washing cooking pots with provided soap before its use**

| | | Day 28: Non-user (N = 53) | Day 28: User (N = 2) |
|---|---|---|---|
| **Facilitators** | | | |
| Remembering/having it become habit | | 17 (32.1%) | 1 (50.0%) |
| Knowing the benefits/importance | | 30 (56.6%) | 0 (0.0%) |
| Personal commitment/initiative | | 5 (9.4%) | 0 (0.0%) |
| Being encouraged | | 3 (5.7%) | 1 (50.0%) |
| Seeing other people do this | | 0 (0.0%) | 0 (0.0%) |
| Having water | | 1 (1.9%) | 0 (0.0%) |
| Having enough soap | | 32 (60.4%) | 1 (50.0%) |
| Having a basin | | 0 (0.0%) | 0 (0.0%) |
| Having the time to do this | | 1 (1.9%) | 0 (0.0%) |
| Other | | 1 (1.9%) | 0 (0.0%) |
| **Barriers** | | | |
| Nothing makes it difficult | | 5 (9.4%) | 1 (50.0%) |
| Not being motivated | | 5 (9.4%) | 0 (0.0%) |
| Forgetting | | 0 (0.0%) | 1 (50.0%) |
| Being too busy | | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | | 0 (0.0%) | 0 (0.0%) |
| Preferring the current way I am doing it | | 6 (11.3%) | 0 (0.0%) |
| Not having water | | 0 (0.0%) | 0 (0.0%) |
| Not having soap | | 14 (26.4%) | 1 (50.0%) |
| Not having a basin | | 1 (1.9%) | 0 (0.0%) |
| Soap is stolen | | 0 (0.0%) | 0 (0.0%) |
| Soap is used for other purposes | | 20 (37.7%) | 0 (0.0%) |
| Irritates hands | | 0 (0.0%) | 0 (0.0%) |
| Smells/tastes bad | | 11 (20.8%) | 0 (0.0%) |
| Damages dishes/pots | | 0 (0.0%) | 0 (0.0%) |
| Other [specify] | | 10 (18.9%) | 0 (0.0%) |

**Table A2-12. Barriers and facilitators to using <u>soapy water bottle</u> for or washing feeding utensils with provided soap after its use**

| | | Day 28: Non-user (N = 53) | Day 28: User (N = 2) |
|---|---|---|---|
| **Facilitators** | | | |
| Remembering/having it become habit | | 20 (37.7%) | 2 (100.0%) |
| Knowing the benefits/importance | | 32 (60.4%) | 1 (50.0%) |
| Personal commitment/initiative | | 6 (11.3%) | 0 (0.0%) |
| Being encouraged | | 4 (7.5%) | 1 (50.0%) |
| Seeing other people do this | | 0 (0.0%) | 0 (0.0%) |
| Having water | | 1 (1.9%) | 0 (0.0%) |
| Having enough soap | | 33 (62.3%) | 1 (50.0%) |
| Having a basin | | 0 (0.0%) | 0 (0.0%) |
| Having the time to do this | | 1 (1.9%) | 0 (0.0%) |
| Other (specify) | | 1 (1.9%) | 0 (0.0%) |
| **Barriers** | | | |
| Nothing makes it difficult | | 9 (17.0%) | 1 (50.0%) |
| Not being motivated | | 4 (7.5%) | 0 (0.0%) |
| Forgetting | | 0 (0.0%) | 0 (0.0%) |
| Being too busy | | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | | 0 (0.0%) | 0 (0.0%) |
| Preferring the current way I am doing it | | 8 (15.1%) | 0 (0.0%) |
| Not having water | | 1 (1.9%) | 0 (0.0%) |
| Not having soap | | 15 (28.3%) | 1 (50.0%) |
| Not having a basin | | 2 (3.8%) | 0 (0.0%) |
| Soap is stolen | | 0 (0.0%) | 0 (0.0%) |
| Soap is used for other purposes | | 16 (30.2%) | 0 (0.0%) |
| Irritates hands | | 0 (0.0%) | 0 (0.0%) |
| Smells/tastes bad | | 10 (18.9%) | 0 (0.0%) |
| Damages dishes/pots | | 0 (0.0%) | 0 (0.0%) |
| Other [specify] | | 6 (11.3%) | 0 (0.0%) |

**Table A2-13. Barriers and facilitators to using <u>two-tier outdoor bamboo rack</u> for storing cooking utensils**

| | Day 1 (N = 28) | Day 10: User (N = 28) | Day 28: Non-user (N = 6) | Day 28: User (N = 21) |
|---|---|---|---|---|
| **Facilitators** | | | | |
| Remembering/having it become habit | 15 (53.6%) | 15 (53.6%) | 2 (33.3%) | 16 (76.2%) |
| Knowing the benefits/importance | 15 (53.6%) | 21 (75.0%) | 3 (50.0%) | 16 (76.2%) |
| Personal commitment/initiative | 2 (7.1%) | 10 (35.7%) | 2 (33.3%) | 8 (38.1%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (4.8%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having the rack close to the kitchen area | 3 (10.7%) | 8 (28.6%) | 1 (16.7%) | 6 (28.6%) |
| Having sunny weather | 3 (10.7%) | 3 (10.7%) | 0 (0.0%) | 6 (28.6%) |
| Having a way to store small utensils | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) | 1 (4.8%) |
| Having a larger rack | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| If the rack was lighter | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | |
| Nothing would make it difficult | 22 (78.6%) | 12 (42.9%) | 3 (50.0%) | 6 (28.6%) |
| Not being motivated | 0 (0.0%) | 3 (10.7%) | 0 (0.0%) | 0 (0.0%) |
| Forgetting | 0 (0.0%) | 2 (7.1%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | 1 (3.6%) | 3 (10.7%) | 0 (0.0%) | 3 (14.3%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Preferring the way I am currently doing it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Not having the storage item/area close to the kitchen area | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) |
| Rack breaks | 2 (7.1%) | 1 (3.6%) | 0 (0.0%) | 5 (23.8%) |
| Rack used for another purpose | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) |
| Rack stolen | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) |
| Rack is dirty | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) | 2 (9.5%) |
| Rack is not big enough | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack is difficult to use | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Items fall through rack or storage item | 0 (0.0%) | 2 (7.1%) | 1 (16.7%) | 5 (23.8%) |
| Poor weather | 4 (14.3%) | 5 (17.9%) | 2 (33.3%) | 10 (47.6%) |
| Other | 0 (0.0%) | 7 (25.0%) | 1 (16.7%) | 3 (14.3%) |

**Table A2-14. Barriers and facilitators to using <u>two-tier outdoor bamboo rack</u> for drying feeding utensils on dish drying rack after the use**

| | Day 10: User (N = 28) | Day 28: Non- user (N = 6) | Day 28: User (N = 21) |
|---|---|---|---|
| **Facilitators** | | | |
| Remembering/having it become habit | 17 (60.7%) | 4 (66.7%) | 15 (71.4%) |
| Knowing the benefits/importance | 15 (53.6%) | 4 (66.7%) | 16 (76.2%) |
| Personal commitment/initiative | 11 (39.3%) | 1 (16.7%) | 4 (19.0%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 1 (4.8%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having the rack close to the kitchen area | 7 (25.0%) | 0 (0.0%) | 5 (23.8%) |
| Having sunny weather | 4 (14.3%) | 0 (0.0%) | 6 (28.6%) |
| Having a way to store small utensils | 0 (0.0%) | 0 (0.0%) | 1 (4.8%) |
| Having a larger rack | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| If the rack was lighter | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other (specify) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | |
| Nothing would make it difficult | 20 (71.4%) | 4 (66.7%) | 10 (47.6%) |
| Not being motivated | 3 (10.7%) | 0 (0.0%) | 0 (0.0%) |
| Forgetting | 2 (7.1%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | 2 (7.1%) | 0 (0.0%) | 1 (4.8%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Preferring the way I am currently doing it | 0 (0.0%) | 1 (16.7%) | 0 (0.0%) |
| Not having the storage item/area close to the kitchen area | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) |
| Rack breaks | 1 (3.6%) | 0 (0.0%) | 5 (23.8%) |
| Rack used for another purpose | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) |
| Rack stolen | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack is dirty | 1 (3.6%) | 0 (0.0%) | 2 (9.5%) |
| Rack is not big enough | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack is difficult to use | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Items fall through rack or storage item | 1 (3.6%) | 0 (0.0%) | 5 (23.8%) |
| Poor weather | 4 (14.3%) | 1 (16.7%) | 7 (33.3%) |
| Other [specify] | 0 (0.0%) | 0 (0.0%) | 1 (4.8%) |

**Table A2-15. Barriers and facilitators to using <u>two-tier wire (metal) rack</u> for storing cooking utensils**

| | Day 1 (N = 28) | Day 10: Non-user (N = 1) | Day 10: User (N = 27) | Day 28: Non-user (N = 1) | Day 28: User (N = 27) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 6 (21.4%) | 0 (0.0%) | 14 (51.9%) | 0 (0.0%) | 20 (74.1%) |
| Knowing the benefits/importance | 11 (39.3%) | 1 (100.0%) | 11 (40.7%) | 0 (0.0%) | 22 (81.5%) |
| Personal commitment/initiative | 8 (28.6%) | 0 (0.0%) | 6 (22.2%) | 0 (0.0%) | 10 (37.0%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having the rack close to the kitchen area | 6 (21.4%) | 0 (0.0%) | 6 (22.2%) | 0 (0.0%) | 6 (22.2%) |
| Having sunny weather | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having a way to store small utensils | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) | 0 (0.0%) | 3 (11.1%) |
| Having a larger rack | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) | 0 (0.0%) | 0 (0.0%) |
| If the rack was lighter | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) | 1 (100.0%) | 1 (3.7%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 25 (89.3%) | 0 (0.0%) | 23 (85.2%) | 0 (0.0%) | 23 (85.2%) |
| Not being motivated | 1 (3.6%) | 0 (0.0%) | 1 (3.7%) | 0 (0.0%) | 1 (3.7%) |
| Forgetting | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | 1 (3.6%) | 0 (0.0%) | 1 (3.7%) | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Preferring the way I am currently doing it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Not having the storage item/area close to the kitchen area | 1 (3.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack breaks | 0 (0.0%) | 0 (0.0%) | 2 (7.4%) | 0 (0.0%) | 3 (11.1%) |
| Rack used for another purpose | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack stolen | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack is dirty | 0 (0.0%) | 1 (100.0%) | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) |
| Rack is not big enough | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) | 0 (0.0%) | 0 (0.0%) |
| Rack is difficult to use | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Items fall through rack or storage item | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Poor weather | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 1 (3.6%) | 1 (100.0%) | 0 (0.0%) | 1 (100.0%) | 0 (0.0%) |

**Table A2-16. Barriers and facilitators to using <u>two-tier wire (metal) rack</u> for drying feeding utensils on dish drying rack after the use**

| | Day 10: Non-user (N = 1) | Day 10: User (N = 27) | Day 28: Non- user (N = 1) | Day 28: User (N = 27) |
|---|---|---|---|---|
| **Facilitators** | | | | |
| Remembering/having it become habit | 1 (100.0%) | 12 (44.4%) | 0 (0.0%) | 24 (88.9%) |
| Knowing the benefits/importance | 1 (100.0%) | 12 (44.4%) | 0 (0.0%) | 22 (81.5%) |
| Personal commitment/initiative | 0 (0.0%) | 9 (33.3%) | 0 (0.0%) | 12 (44.4%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having the rack close to the kitchen area | 0 (0.0%) | 4 (14.8%) | 0 (0.0%) | 5 (18.5%) |
| Having sunny weather | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having a way to store small utensils | 0 (0.0%) | 1 (3.7%) | 0 (0.0%) | 3 (11.1%) |
| Having a larger rack | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| If the rack was lighter | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other (specify) | 0 (0.0%) | 0 (0.0%) | 1 (100.0%) | 0 (0.0%) |
| **Barriers** | | | | |
| Nothing would make it difficult | 0 (0.0%) | 25 (92.6%) | 0 (0.0%) | 23 (85.2%) |
| Not being motivated | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) |
| Forgetting | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Preferring the way I am currently doing it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Not having the storage item/area close to the kitchen area | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack breaks | 0 (0.0%) | 2 (7.4%) | 0 (0.0%) | 3 (11.1%) |
| Rack used for another purpose | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack stolen | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack is dirty | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (3.7%) |
| Rack is not big enough | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Rack is difficult to use | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Items fall through rack or storage item | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Poor weather | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other [specify] | 1 (100.0%) | 0 (0.0%) | 1 (100.0%) | 0 (0.0%) |

**Table A2-17. Barriers and facilitators to using <u>traditional bamboo mat with maize sack topper</u> for placing child on it while feeding**

| | | Day 1 (N = 28) | Day 10: User (N = 28) | Day 28: User (N = 27) |
|---|---|---|---|---|
| **Facilitators** | | | | |
| Remembering/having it become habit | | 10 (35.7%) | 22 (78.6%) | 16 (59.3%) |
| Knowing the benefits/importance | | 14 (50.0%) | 17 (60.7%) | 20 (74.1%) |
| Personal commitment/initiative | | 6 (21.4%) | 12 (42.9%) | 5 (18.5%) |
| Being encouraged | | 0 (0.0%) | 2 (7.1%) | 1 (3.7%) |
| Seeing other people do this | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| It is convenient/easy to do this | | 4 (14.3%) | 1 (3.6%) | 0 (0.0%) |
| Mat not being used for something else | | 0 (0.0%) | 3 (10.7%) | 1 (3.7%) |
| Mat being clean | | 6 (21.4%) | 6 (21.4%) | 10 (37.0%) |
| Mat in good repair | | 1 (3.6%) | 4 (14.3%) | 6 (22.2%) |
| Child eats their food when placed here | | 0 (0.0%) | 2 (7.1%) | 0 (0.0%) |
| Child does not cry when placed here | | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) |
| Child stays put/does not move away | | 0 (0.0%) | 2 (7.1%) | 3 (11.1%) |
| Child is safe/does not get injured | | 0 (0.0%) | 0 (0.0%) | 2 (7.4%) |
| Animals do not bother child/food | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) |
| **Barriers** | | | | |
| Nothing would make it difficult | | 16 (57.1%) | 12 (42.9%) | 15 (55.6%) |
| Not being motivated | | 1 (3.6%) | 1 (3.6%) | 2 (7.4%) |
| Forgetting | | 5 (17.9%) | 1 (3.6%) | 1 (3.7%) |
| Being too busy | | 5 (17.9%) | 5 (17.9%) | 3 (11.1%) |
| Being discouraged by others/others disapprove | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Mat being used for something else | | 3 (10.7%) | 5 (17.9%) | 0 (0.0%) |
| Mat not clean | | 3 (10.7%) | 5 (17.9%) | 8 (29.6%) |
| Mat not in good repair | | 0 (0.0%) | 0 (0.0%) | 2 (7.4%) |
| Child won't eat their food when placed here | | 0 (0.0%) | 2 (7.1%) | 1 (3.7%) |
| Child cries when placed here | | 0 (0.0%) | 2 (7.1%) | 0 (0.0%) |
| Child won't stay put | | 0 (0.0%) | 2 (7.1%) | 1 (3.7%) |
| Child gets injured | | 0 (0.0%) | 0 (0.0%) | 2 (7.4%) |
| Animals bother child/food | | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) |
| Other | | 0 (0.0%) | 1 (3.6%) | 0 (0.0%) |

**Table A2-18. Barriers and facilitators to using <u>imported plastic mat</u> for placing child on it while feeding**

| | | Day 1 (N = 28) | Day 10: User (N = 28) | Day 28: User (N = 28) |
|---|---|---|---|---|
| **Facilitators** | | | | |
| Remembering/having it become habit | | 8 (28.6%) | 14 (50.0%) | 22 (78.6%) |
| Knowing the benefits/importance | | 7 (25.0%) | 7 (25.0%) | 16 (57.1%) |
| Personal commitment/initiative | | 7 (25.0%) | 10 (35.7%) | 15 (53.6%) |
| Being encouraged | | 0 (0.0%) | 1 (3.6%) | 2 (7.1%) |
| Seeing other people do this | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| It is convenient/easy to do this | | 1 (3.6%) | 0 (0.0%) | 3 (10.7%) |
| Mat not being used for something else | | 4 (14.3%) | 2 (7.1%) | 3 (10.7%) |
| Mat being clean | | 4 (14.3%) | 5 (17.9%) | 8 (28.6%) |
| Mat in good repair | | 4 (14.3%) | 3 (10.7%) | 4 (14.3%) |
| Child eats their food when placed here | | 2 (7.1%) | 1 (3.6%) | 3 (10.7%) |
| Child does not cry when placed here | | 0 (0.0%) | 2 (7.1%) | 2 (7.1%) |
| Child stays put/does not move away | | 2 (7.1%) | 1 (3.6%) | 1 (3.6%) |
| Child is safe/does not get injured | | 1 (3.6%) | 0 (0.0%) | 1 (3.6%) |
| Animals do not bother child/food | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | | 0 (0.0%) | 0 (0.0%) | 2 (7.1%) |
| **Barriers** | | | | |
| Nothing would make it difficult | | 21 (75.0%) | 21 (75.0%) | 12 (42.9%) |
| Not being motivated | | 1 (3.6%) | 1 (3.6%) | 0 (0.0%) |
| Forgetting | | 0 (0.0%) | 3 (10.7%) | 4 (14.3%) |
| Being too busy | | 1 (3.6%) | 2 (7.1%) | 3 (10.7%) |
| Being discouraged by others/others disapprove | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Mat being used for something else | | 1 (3.6%) | 0 (0.0%) | 4 (14.3%) |
| Mat not clean | | 2 (7.1%) | 2 (7.1%) | 5 (17.9%) |
| Mat not in good repair | | 2 (7.1%) | 1 (3.6%) | 3 (10.7%) |
| Child won't eat their food when placed here | | 0 (0.0%) | 0 (0.0%) | 1 (3.6%) |
| Child cries when placed here | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Child won't stay put | | 1 (3.6%) | 0 (0.0%) | 1 (3.6%) |
| Child gets injured | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Animals bother child/food | | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | | 1 (3.6%) | 0 (0.0%) | 4 (14.3%) |

**Table A2-19. Barriers and facilitators to <u>divided food storage container</u> to store leftover food**

| | Day 1<br>(N = 56) | Day 10:<br>Non-user<br>(N = 5) | Day 10:<br>User<br>(N = 51) | Day 28:<br>Non- user<br>(N = 2) | Day 28:<br>User<br>(N = 53) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 15 (26.8%) | 3 (60.0%) | 30 (58.8%) | 1 (50.0%) | 41 (77.4%) |
| Knowing the benefits/importance | 23 (41.1%) | 3 (60.0%) | 26 (51.0%) | 2 (100.0%) | 38 (71.7%) |
| Personal commitment/initiative | 9 (16.1%) | 0 (0.0%) | 17 (33.3%) | 0 (0.0%) | 17 (32.1%) |
| Being encouraged to do this | 2 (3.6%) | 0 (0.0%) | 1 (2.0%) | 1 (50.0%) | 2 (3.8%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| If it is easy to find the lids | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| If the container is clean | 17 (30.4%) | 2 (40.0%) | 13 (25.5%) | 1 (50.0%) | 10 (18.9%) |
| If the container was bigger | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| If the container was smaller | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| If the container was easier to clean | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 6 (10.7%) | 0 (0.0%) | 2 (3.9%) | 0 (0.0%) | 2 (3.8%) |
| **Barriers** | | | | | |
| Nothing makes it difficult | 43 (76.8%) | 0 (0.0%) | 41 (80.4%) | 0 (0.0%) | 33 (62.3%) |
| Not being motivated | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (50.0%) | 2 (3.8%) |
| Forgetting | 3 (5.4%) | 1 (20.0%) | 1 (2.0%) | 0 (0.0%) | 2 (3.8%) |
| Being too busy | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Preferring the way I currently do it | 0 (0.0%) | 0 (0.0%) | 1 (2.0%) | 0 (0.0%) | 0 (0.0%) |
| Losing lids/containers | 5 (8.9%) | 1 (20.0%) | 1 (2.0%) | 1 (50.0%) | 1 (1.9%) |
| Lid/container being stolen | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (3.8%) |
| Lids/containers breaking or being damaged | 1 (1.8%) | 1 (20.0%) | 3 (5.9%) | 1 (50.0%) | 6 (11.3%) |
| Lids being used for other purposes | 0 (0.0%) | 0 (0.0%) | 3 (5.9%) | 0 (0.0%) | 1 (1.9%) |
| Lids being dirty | 2 (3.6%) | 0 (0.0%) | 7 (13.7%) | 0 (0.0%) | 4 (7.5%) |
| Condensation/moisture will ruin the food | 1 (1.8%) | 1 (20.0%) | 1 (2.0%) | 0 (0.0%) | 3 (5.7%) |
| Container will be too small | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Container will be too large | 0 (0.0%) | 1 (20.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Other | 2 (3.6%) | 1 (20.0%) | 2 (3.9%) | 1 (50.0%) | 6 (11.3%) |

**Table A2-20. Barriers and facilitators to using <u>flat plate</u> to feed child**

| | Day 1 (N = 56) | Day 10: User (N = 56) | Day 28: User (N = 55) |
|---|---|---|---|
| **Facilitators** | | | |
| Remembering/having it become habit | 17 (30.4%) | 35 (62.5%) | 38 (69.1%) |
| Knowing the benefits/importance | 13 (23.2%) | 23 (41.1%) | 33 (60.0%) |
| Personal commitment/initiative | 13 (23.2%) | 19 (33.9%) | 21 (38.2%) |
| Being encouraged | 0 (0.0%) | 1 (1.8%) | 2 (3.6%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having enough food | 6 (10.7%) | 5 (8.9%) | 4 (7.3%) |
| Having a convenient place to store the plate | 14 (25.0%) | 3 (5.4%) | 8 (14.5%) |
| If my child likes the plate | 1 (1.8%) | 3 (5.4%) | 2 (3.6%) |
| Child is self-feeding | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) |
| Child is fed | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 6 (10.7%) | 1 (1.8%) | 7 (12.7%) |
| **Barriers** | | | |
| Nothing would make it difficult | 42 (75.0%) | 40 (71.4%) | 37 (67.3%) |
| Not being motivated | 1 (1.8%) | 2 (3.6%) | 2 (3.6%) |
| Forgetting | 1 (1.8%) | 3 (5.4%) | 0 (0.0%) |
| Being too busy | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Plate is broken | 2 (3.6%) | 4 (7.1%) | 6 (10.9%) |
| Plate is dirty | 5 (8.9%) | 14 (25.0%) | 12 (21.8%) |
| Plate is stolen | 0 (0.0%) | 2 (3.6%) | 1 (1.8%) |
| Plate is used for another purpose | 0 (0.0%) | 2 (3.6%) | 1 (1.8%) |
| Plate is inconvenient/not nearby when I need it | 4 (7.1%) | 0 (0.0%) | 2 (3.6%) |
| Child does not like the dish | 1 (1.8%) | 0 (0.0%) | 1 (1.8%) |
| Child is self-feeding | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Child is fed | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 2 (3.6%) | 1 (1.8%) | 3 (5.5%) |

**Table A2-21. Barriers and facilitators to using <u>divided plate</u> to feed child**

| | Day 1<br>(N = 56) | Day 10:<br>Non-user<br>(N = 5) | Day 10:<br>User<br>(N = 51) | Day 28:<br>Non- user<br>(N = 2) | Day 28:<br>User<br>(N = 53) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 18 (32.1%) | 3 (60.0%) | 32 (62.7%) | 2 (100.0%) | 37 (69.8%) |
| Knowing the benefits/importance | 13 (23.2%) | 3 (60.0%) | 20 (39.2%) | 2 (100.0%) | 30 (56.6%) |
| Personal commitment/initiative | 11 (19.6%) | 1 (20.0%) | 18 (35.3%) | 0 (0.0%) | 19 (35.8%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 1 (2.0%) | 0 (0.0%) | 2 (3.8%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having enough food | 3 (5.4%) | 2 (40.0%) | 3 (5.9%) | 1 (50.0%) | 9 (17.0%) |
| Having a convenient place to store the plate | 15 (26.8%) | 0 (0.0%) | 3 (5.9%) | 0 (0.0%) | 7 (13.2%) |
| If my child likes the plate | 0 (0.0%) | 0 (0.0%) | 3 (5.9%) | 1 (50.0%) | 1 (1.9%) |
| Child is self-feeding | 3 (5.4%) | 0 (0.0%) | 2 (3.9%) | 0 (0.0%) | 1 (1.9%) |
| Child is fed | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Other | 5 (8.9%) | 0 (0.0%) | 1 (2.0%) | 0 (0.0%) | 7 (13.2%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 43 (76.8%) | 0 (0.0%) | 39 (76.5%) | 0 (0.0%) | 35 (66.0%) |
| Not being motivated | 0 (0.0%) | 1 (20.0%) | 0 (0.0%) | 0 (0.0%) | 2 (3.8%) |
| Forgetting | 1 (1.8%) | 1 (20.0%) | 4 (7.8%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | 0 (0.0%) | 0 (0.0%) | 1 (2.0%) | 0 (0.0%) | 1 (1.9%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Plate is broken | 2 (3.6%) | 1 (20.0%) | 3 (5.9%) | 2 (100.0%) | 4 (7.5%) |
| Plate is dirty | 8 (14.3%) | 4 (80.0%) | 10 (19.6%) | 2 (100.0%) | 10 (18.9%) |
| Plate is stolen | 0 (0.0%) | 0 (0.0%) | 2 (3.9%) | 0 (0.0%) | 1 (1.9%) |
| Plate is used for another purpose | 0 (0.0%) | 1 (20.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Plate is inconvenient/not nearby when I need it | 4 (7.1%) | 0 (0.0%) | 0 (0.0%) | 1 (50.0%) | 2 (3.8%) |
| Child does not like the dish | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Child is self-feeding | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Child is fed | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 1 (1.8%) | 1 (20.0%) | 1 (2.0%) | 0 (0.0%) | 4 (7.5%) |

**Table A2-22. Barriers and facilitators to using a plastic spoon to feed child**

| | Day 1 (N = 56) | Day 10: Non-user (N = 1) | Day 10: User (N = 55) | Day 28: Non- user (N = 1) | Day 28: User (N = 54) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 20 (35.7%) | 0 (0.0%) | 28 (50.9%) | 1 (100.0%) | 30 (55.6%) |
| Knowing the benefits/importance | 21 (37.5%) | 0 (0.0%) | 23 (41.8%) | 0 (0.0%) | 34 (63.0%) |
| Personal commitment/initiative | 8 (14.3%) | 0 (0.0%) | 15 (27.3%) | 0 (0.0%) | 19 (35.2%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| It is convenient/easy | 5 (8.9%) | 0 (0.0%) | 9 (16.4%) | 0 (0.0%) | 14 (25.9%) |
| Spoon not in use by someone else | 4 (7.1%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 3 (5.6%) |
| Spoon is clean | 18 (32.1%) | 1 (100.0%) | 12 (21.8%) | 1 (100.0%) | 9 (16.7%) |
| Spoon is nearby | 5 (8.9%) | 1 (100.0%) | 11 (20.0%) | 1 (100.0%) | 19 (35.2%) |
| Child is self-feeding | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Child is fed | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 3 (5.4%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (3.7%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 39 (69.6%) | 0 (0.0%) | 38 (69.1%) | 0 (0.0%) | 34 (63.0%) |
| Not being motivated | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) | 1 (100.0%) | 0 (0.0%) |
| Forgetting | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) |
| Being too busy | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Spoon in use by someone else | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 1 (1.9%) |
| Spoon is dirty | 9 (16.1%) | 1 (100.0%) | 9 (16.4%) | 1 (100.0%) | 8 (14.8%) |
| Spoon is stolen | 6 (10.7%) | 0 (0.0%) | 5 (9.1%) | 0 (0.0%) | 5 (9.3%) |
| Spoon is broken | 6 (10.7%) | 0 (0.0%) | 5 (9.1%) | 1 (100.0%) | 6 (11.1%) |
| Caregiver could be burned | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Child could be burned | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Spoon is not nearby | 2 (3.6%) | 1 (100.0%) | 6 (10.9%) | 1 (100.0%) | 11 (20.4%) |
| Child is self-feeding | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Child is fed | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 1 (1.9%) |

**Table A2-23. Barriers and facilitators to storing food ingredients covered**

| | Day 1 (N = 56) | Day 10: Non-user (N = 1) | Day 10: User (N = 55) | Day 28: Non- user (N = 1) | Day 28: (N = 54) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 20 (35.7%) | 0 (0.0%) | 25 (45.5%) | 0 (0.0%) | 32 (59.3%) |
| Knowing the benefits/importance | 28 (50.0%) | 0 (0.0%) | 26 (47.3%) | 1 (100.0%) | 38 (70.4%) |
| Personal commitment/initiative | 2 (3.6%) | 0 (0.0%) | 24 (43.6%) | 1 (100.0%) | 23 (42.6%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 6 (10.9%) | 0 (0.0%) | 5 (9.3%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Owning containers with lids | 18 (32.1%) | 1 (100.0%) | 17 (30.9%) | 1 (100.0%) | 12 (22.2%) |
| Owning extra lids | 3 (5.4%) | 0 (0.0%) | 3 (5.5%) | 0 (0.0%) | 4 (7.4%) |
| Having clean lids available | 0 (0.0%) | 0 (0.0%) | 4 (7.3%) | 0 (0.0%) | 5 (9.3%) |
| Owning enough plates/utensils to use as lids | 13 (23.2%) | 0 (0.0%) | 15 (27.3%) | 1 (100.0%) | 17 (31.5%) |
| Being able to find the lids | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Other | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 20 (35.7%) | 0 (0.0%) | 25 (45.5%) | 0 (0.0%) | 27 (50.0%) |
| Not being motivated | 1 (1.8%) | 0 (0.0%) | 2 (3.6%) | 0 (0.0%) | 4 (7.4%) |
| Forgetting | 9 (16.1%) | 0 (0.0%) | 13 (23.6%) | 0 (0.0%) | 14 (25.9%) |
| Being too busy | 5 (8.9%) | 0 (0.0%) | 8 (14.5%) | 0 (0.0%) | 11 (20.4%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Losing lids | 4 (7.1%) | 0 (0.0%) | 4 (7.3%) | 0 (0.0%) | 3 (5.6%) |
| Losing plates/objects used as lids | 1 (1.8%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) |
| Lids breaking | 2 (3.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 3 (5.6%) |
| Plates/objects used as lids breaking | 1 (1.8%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 4 (7.4%) |
| Lids being used for other purposes | 9 (16.1%) | 0 (0.0%) | 5 (9.1%) | 1 (100.0%) | 3 (5.6%) |
| Plates/objects used as lids all used for other purposes | 13 (23.2%) | 0 (0.0%) | 10 (18.2%) | 1 (100.0%) | 5 (9.3%) |
| Lids are dirty | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 5 (9.3%) |
| plates/objects used as lids are dirty | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) |
| Other | 1 (1.8%) | 1 (100.0%) | 7 (12.7%) | 0 (0.0%) | 1 (1.9%) |

**Table A2-24. Barriers and facilitators to keeping food ingredients elevated**

| | Day 1 (N = 56) | Day 10: Non-user (N = 6) | Day 10: User (N = 50) | Day 28: Non-user (N = 2) | Day 28: User (N = 53) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 10 (17.9%) | 0 (0.0%) | 21 (42.0%) | 0 (0.0%) | 29 (54.7%) |
| Knowing the benefits/initiative | 26 (46.4%) | 3 (50.0%) | 20 (40.0%) | 1 (50.0%) | 37 (69.8%) |
| Personal commitment/caring | 3 (5.4%) | 1 (16.7%) | 24 (48.0%) | 0 (0.0%) | 23 (43.4%) |
| Being encouraged | 1 (1.8%) | 1 (16.7%) | 5 (10.0%) | 0 (0.0%) | 4 (7.5%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having a shelf or other elevated surface to use for this purpose (e.g., chair, table) | 34 (60.7%) | 6 (100.0%) | 23 (46.0%) | 2 (100.0%) | 31 (58.5%) |
| Easy to reach elevated surface | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Other | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 22 (39.3%) | 0 (0.0%) | 30 (60.0%) | 0 (0.0%) | 28 (52.8%) |
| Not being motivated | 1 (1.8%) | 2 (33.3%) | 2 (4.0%) | 0 (0.0%) | 2 (3.8%) |
| Forgetting | 5 (8.9%) | 2 (33.3%) | 7 (14.0%) | 0 (0.0%) | 11 (20.8%) |
| Being too busy | 2 (3.6%) | 0 (0.0%) | 5 (10.0%) | 0 (0.0%) | 9 (17.0%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Having no elevated surface to use for this purpose | 23 (41.1%) | 4 (66.7%) | 11 (22.0%) | 2 (100.0%) | 11 (20.8%) |
| Elevated surface is used for another purpose | 7 (12.5%) | 0 (0.0%) | 3 (6.0%) | 0 (0.0%) | 6 (11.3%) |
| Elevated surface is broken | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (3.8%) |
| Elevated surface is dirty | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) |
| Elevated surface is difficult to reach | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 0 (0.0%) | 0 (0.0%) | 2 (4.0%) | 0 (0.0%) | 1 (1.9%) |

**Table A2-25. Barriers and facilitators to washing fruits before giving it to the child**

| | Day 1 (N = 56) | Day 10: Non-user (N = 2) | Day 10: User (N = 54) | Day 28: Non-user (N = 2) | Day 28: User (N = 53) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 14 (25.0%) | 1 (50.0%) | 21 (38.9%) | 1 (50.0%) | 29 (54.7%) |
| Knowing the benefits/importance | 30 (53.6%) | 1 (50.0%) | 22 (40.7%) | 1 (50.0%) | 40 (75.5%) |
| Personal commitment/initiative | 7 (12.5%) | 0 (0.0%) | 18 (33.3%) | 0 (0.0%) | 15 (28.3%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 2 (3.8%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having enough water available | 15 (26.8%) | 0 (0.0%) | 7 (13.0%) | 1 (50.0%) | 7 (13.2%) |
| Having clean water | 11 (19.6%) | 1 (50.0%) | 14 (25.9%) | 1 (50.0%) | 25 (47.2%) |
| Having water storage containers | 5 (8.9%) | 0 (0.0%) | 9 (16.7%) | 1 (50.0%) | 7 (13.2%) |
| Having fruits | 3 (5.4%) | 0 (0.0%) | 5 (9.3%) | 0 (0.0%) | 1 (1.9%) |
| Having time to get water | 1 (1.8%) | 0 (0.0%) | 0 (0.0%) | 2 (100.0%) | 1 (1.9%) |
| Having time to prepare fruits | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 28 (50.0%) | 0 (0.0%) | 35 (64.8%) | 0 (0.0%) | 35 (66.0%) |
| Not being motivated | 2 (3.6%) | 0 (0.0%) | 2 (3.7%) | 0 (0.0%) | 4 (7.5%) |
| Forgetting | 2 (3.6%) | 1 (50.0%) | 8 (14.8%) | 0 (0.0%) | 5 (9.4%) |
| Being too busy | 10 (17.9%) | 0 (0.0%) | 4 (7.4%) | 0 (0.0%) | 5 (9.4%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Not enough water available | 10 (17.9%) | 1 (50.0%) | 8 (14.8%) | 2 (100.0%) | 10 (18.9%) |
| Lack of water storage containers | 4 (7.1%) | 0 (0.0%) | 0 (0.0%) | 1 (50.0%) | 2 (3.8%) |
| Water is not clean | 1 (1.8%) | 0 (0.0%) | 4 (7.4%) | 0 (0.0%) | 2 (3.8%) |
| Other | 0 (0.0%) | 0 (0.0%) | 2 (3.7%) | 1 (50.0%) | 4 (7.5%) |

**Table A2-26. Barriers and facilitators to elevating surface to prevent exposure to dirt, animal, feces**

| | Day 1 (N = 53) | Day 10: Non-user (N = 9) | Day 10: User (N = 47) | Day 28: Non-user (N = 10) | Day 28: User (N = 45) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 15 (28.3%) | 2 (22.2%) | 24 (51.1%) | 1 (10.0%) | 25 (55.6%) |
| Knowing the benefits/importance | 26 (49.1%) | 5 (55.6%) | 23 (48.9%) | 9 (90.0%) | 30 (66.7%) |
| Personal commitment/initiative | 8 (15.1%) | 3 (33.3%) | 21 (44.7%) | 1 (10.0%) | 14 (31.1%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (10.0%) | 4 (8.9%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time to do this | 0 (0.0%) | 0 (0.0%) | 1 (2.1%) | 0 (0.0%) | 2 (4.4%) |
| Having a surface to elevate foodstuffs | 13 (24.5%) | 4 (44.4%) | 19 (40.4%) | 9 (90.0%) | 25 (55.6%) |
| Having a food cover | 2 (3.8%) | 2 (22.2%) | 3 (6.4%) | 6 (60.0%) | 3 (6.7%) |
| Animals not being around | 0 (0.0%) | 1 (11.1%) | 1 (2.1%) | 2 (20.0%) | 1 (2.2%) |
| Having a broom | 0 (0.0%) | 0 (0.0%) | 1 (2.1%) | 0 (0.0%) | 0 (0.0%) |
| Other | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing would make it difficult | 31 (58.5%) | 1 (11.1%) | 29 (61.7%) | 0 (0.0%) | 30 (66.7%) |
| Not being motivated | 3 (5.7%) | 0 (0.0%) | 3 (6.4%) | 0 (0.0%) | 2 (4.4%) |
| Forgetting | 4 (7.5%) | 0 (0.0%) | 7 (14.9%) | 3 (30.0%) | 5 (11.1%) |
| Being too busy | 7 (13.2%) | 4 (44.4%) | 5 (10.6%) | 5 (50.0%) | 5 (11.1%) |
| Being discouraged by others/others disapprove | 1 (1.9%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer how you currently do it | 0 (0.0%) | 1 (11.1%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Elevated surface dirty | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (10.0%) | 0 (0.0%) |
| Elevated surface broken | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (2.2%) |
| Elevated surface used for something else | 4 (7.5%) | 5 (55.6%) | 8 (17.0%) | 4 (40.0%) | 9 (20.0%) |
| Lack of food covers | 2 (3.8%) | 1 (11.1%) | 1 (2.1%) | 2 (20.0%) | 2 (4.4%) |
| Food covers dirty | 1 (1.9%) | 0 (0.0%) | 2 (4.3%) | 0 (0.0%) | 1 (2.2%) |
| Food covers broken | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Food covers used for something else | 0 (0.0%) | 1 (11.1%) | 1 (2.1%) | 4 (40.0%) | 4 (8.9%) |
| Animals in cooking area | 1 (1.9%) | 0 (0.0%) | 1 (2.1%) | 3 (30.0%) | 3 (6.7%) |
| Other | 0 (0.0%) | 1 (11.1%) | 0 (0.0%) | 3 (30.0%) | 1 (2.2%) |

**Table A2-27. Barriers and facilitators to cooking food until steaming bubbling**

| | Day 1 (N = 56) | Day 10: User (N = 56) | Day 28: User (N = 55) |
|---|---|---|---|
| **Facilitators** | | | |
| Remembering/having it become habit | 7 (12.5%) | 24 (42.9%) | 30 (54.5%) |
| Knowing the benefits/importance | 24 (42.9%) | 24 (42.9%) | 40 (72.7%) |
| Personal commitment/initiative | 6 (10.7%) | 23 (41.1%) | 18 (32.7%) |
| Being encouraged | 0 (0.0%) | 1 (1.8%) | 2 (3.6%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time to do this | 0 (0.0%) | 0 (0.0%) | 3 (5.5%) |
| Having fuel/firewood | 31 (55.4%) | 31 (55.4%) | 34 (61.8%) |
| Having pots | 5 (8.9%) | 4 (7.1%) | 3 (5.5%) |
| Good weather | 0 (0.0%) | 1 (1.8%) | 0 (0.0%) |
| Having foodstuffs | 2 (3.6%) | 3 (5.4%) | 4 (7.3%) |
| Prefer the way food tastes this way | 4 (7.1%) | 7 (12.5%) | 13 (23.6%) |
| Other | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | |
| Nothing makes it difficult | 13 (23.2%) | 27 (48.2%) | 23 (41.8%) |
| Not being motivated | 0 (0.0%) | 1 (1.8%) | 1 (1.8%) |
| Forgetting | 0 (0.0%) | 0 (0.0%) | 1 (1.8%) |
| Being too busy | 2 (3.6%) | 5 (8.9%) | 4 (7.3%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Lack of fuel/firewood | 39 (69.6%) | 28 (50.0%) | 32 (58.2%) |
| Lack of pots | 3 (5.4%) | 2 (3.6%) | 2 (3.6%) |
| Weather makes cooking difficult | 1 (1.8%) | 1 (1.8%) | 0 (0.0%) |
| Lack of foodstuffs | 2 (3.6%) | 2 (3.6%) | 2 (3.6%) |
| Food does not always taste good this way | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Other | 1 (1.8%) | 1 (1.8%) | 0 (0.0%) |

**Table A2-28. Barriers and facilitators to reheating leftover food until bubbling/steaming**

| | Day 1 (N = 56) | Day 10: Non-user (N = 2) | Day 10: User (N = 54) | Day 28: Non-user (N = 2) | Day 28: User (N = 53) |
|---|---|---|---|---|---|
| **Facilitators** | | | | | |
| Remembering/having it become habit | 12 (21.4%) | 0 (0.0%) | 25 (46.3%) | 1 (50.0%) | 29 (54.7%) |
| Knowing the benefits/importance | 20 (35.7%) | 2 (100.0%) | 25 (46.3%) | 1 (50.0%) | 42 (79.2%) |
| Personal commitment/initiative | 4 (7.1%) | 0 (0.0%) | 15 (27.8%) | 0 (0.0%) | 20 (37.7%) |
| Being encouraged | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) | 0 (0.0%) | 1 (1.9%) |
| Seeing other people do this | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Having time to do this | 0 (0.0%) | 0 (0.0%) | 2 (3.7%) | 0 (0.0%) | 3 (5.7%) |
| Having fuel/firewood | 38 (67.9%) | 2 (100.0%) | 28 (51.9%) | 2 (100.0%) | 31 (58.5%) |
| Having pots | 6 (10.7%) | 0 (0.0%) | 6 (11.1%) | 0 (0.0%) | 2 (3.8%) |
| Good weather | 0 (0.0%) | 0 (0.0%) | 1 (1.9%) | 0 (0.0%) | 0 (0.0%) |
| Having foodstuffs | 4 (7.1%) | 1 (50.0%) | 4 (7.4%) | 0 (0.0%) | 6 (11.3%) |
| Prefer the way food tastes this way | 5 (8.9%) | 0 (0.0%) | 7 (13.0%) | 0 (0.0%) | 13 (24.5%) |
| Other | 2 (3.6%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| **Barriers** | | | | | |
| Nothing makes it difficult | 17 (30.4%) | 0 (0.0%) | 21 (38.9%) | 0 (0.0%) | 21 (39.6%) |
| Not being motivated | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (50.0%) | 1 (1.9%) |
| Forgetting | 0 (0.0%) | 0 (0.0%) | 3 (5.6%) | 0 (0.0%) | 2 (3.8%) |
| Being too busy | 4 (7.1%) | 0 (0.0%) | 10 (18.5%) | 0 (0.0%) | 8 (15.1%) |
| Being discouraged by others/others disapprove | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) |
| Prefer the way I currently do it | 0 (0.0%) | 0 (0.0%) | 0 (0.0%) | 1 (50.0%) | 0 (0.0%) |
| Lack of fuel/firewood | 36 (64.3%) | 1 (50.0%) | 28 (51.9%) | 2 (100.0%) | 28 (52.8%) |
| Lack of pots | 5 (8.9%) | 0 (0.0%) | 4 (7.4%) | 0 (0.0%) | 1 (1.9%) |
| Weather makes cooking difficult | 1 (1.8%) | 0 (0.0%) | 1 (1.9%) | 0 (0.0%) | 0 (0.0%) |
| Lack of foodstuffs | 2 (3.6%) | 1 (50.0%) | 5 (9.3%) | 0 (0.0%) | 7 (13.2%) |
| Food does not always taste good this way | 0 (0.0%) | 2 (100.0%) | 2 (3.7%) | 1 (50.0%) | 1 (1.9%) |
| Other | 0 (0.0%) | 0 (0.0%) | 3 (5.6%) | 0 (0.0%) | 2 (3.8%) |