



Adherence to Ration Guidance During Preparation or Feeding of Four Specialized Nutritious Foods Does Not Influence Recovery from Moderate Acute Malnutrition (MAM)

Stacy Griswold¹, Breanne Langlois,¹ Devika Suri,¹ Ye Shen,¹ Shelley Walton¹, Kenneth Kwan Ho Chui², Patrick Webb¹, Beatrice L. Rogers¹
¹Friedman School of Nutrition Science and Policy, Tufts University; ²Tufts University Medical School

Background and Objective

• **Fortified blended flours (FBFs)** require preparation with **boiling water**, sometimes with **fortified vegetable oil (FVO)**, using prescribed **quantities and ratios**.

• **Lipid-based nutrient supplements (LNS)** are ready-to-eat, individually packaged, and prescribed for consumption **without adding other ingredients/foods**.

This analysis assessed **adherence** with recipe and ration instructions (“adherence to protocol”) and whether this influenced **treatment effectiveness** for moderate acute malnutrition (MAM).

Study Setting and Methods

• A cluster-randomized cost-effectiveness trial in Sierra Leone compared four isocaloric foods (Table 1) in treating children 6-59 months with uncomplicated moderate acute malnutrition (MAM).

• Caregivers were advised every 2 weeks by trained nurses on ingredients, quantities, and daily rations.

• A random sub-sample participated in 5-day consecutive in-home observations and/or in-depth interviews recording food preparation methods and behaviors.

• Respondents were categorized in two ways: (for RUSF) correct if eaten without other food or (for FBFs) using too little, the correct amount, or too much; or using the recommended ratios of ingredients.

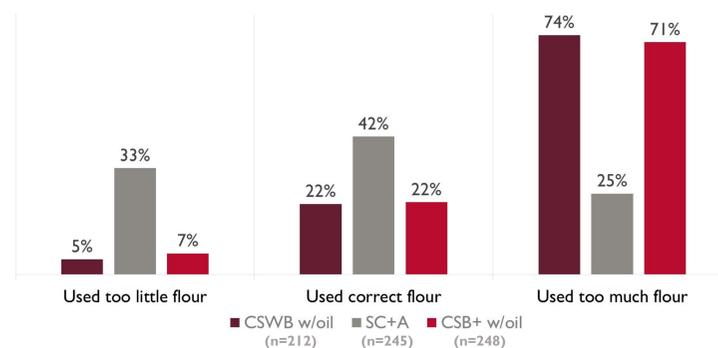
• Chi-square test or unadjusted logistic regression evaluated the relationship between adherence to protocol and graduation from treatment.



Food	Food (g)	Water (g)	Water:Flour Ratio (ml/ml)	Oil (g)
Corn Soy Blend Plus	85.7	350	.33	25.7
Corn Soy Whey Blend	85.7	350	.33	25.7
SUPER CEREAL plus	135.7	250	.4	—
RUSF	100	—	—	—

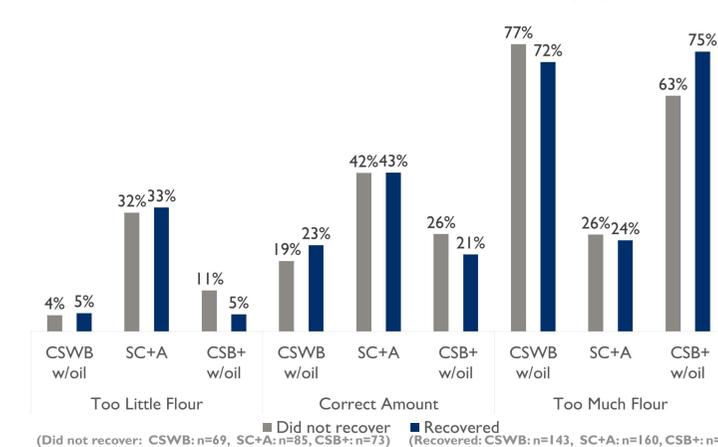
Results: PERCENT OF RESPONDENTS ADHERING TO PROTOCOL AT LAST PREPARATION

FIGURE 1: COMPARING MEASURED QUANTITY OF FLOUR (ML)



Chi-square test comparing all three FBFs p-value<.001. Chi-square test comparing only CSWB w/oil and CSB+ w/oil p-value=.71. Consistent with expectations, there was no significant difference in adherence to protocol between the CSB+ w/oil and CSWB w/oil; majority of respondents did not adhere to preparation protocol for quantity of flour but this was most acute in the CSB+ w/oil and CSWB w/oil arms.

FIGURE 2: COMPARING RECOVERED TO FAILED: FLOUR (ML)



Chi-square test from logistic regression p=.73. There was no statistically significant difference between recovered and not recovered within categories of adherence to protocol; the biggest visible contrast is in the CSB+ w/oil arm when comparing recovered v not recovered in the *too little flour* and *too much flour* categories; this was not statistically significant

Among observed: represents percent of households that were observed to measure the recommended ingredients and only the recommended ingredients at least once during 5-day consecutive observation. Among self-reported: represents percent of respondents who reported trying to measure the ingredients and only the ingredients counseled by a nurse or health worker.

Though adherence to protocol was generally over-reported, the general trend between foods was observed to be accurate (e.g. highest in SC+A and lowest in RUSF); generally, the difference between observed behavior and self-report was 13~20 percentage points.

FIGURE 7: COMPARING OBSERVED BEHAVIOR TO SELF-REPORTED BEHAVIORS.

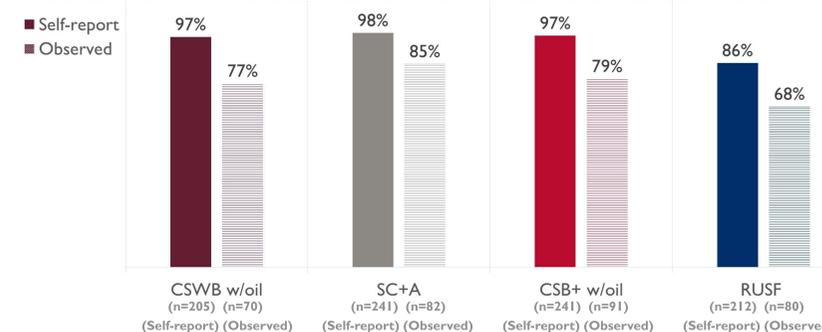
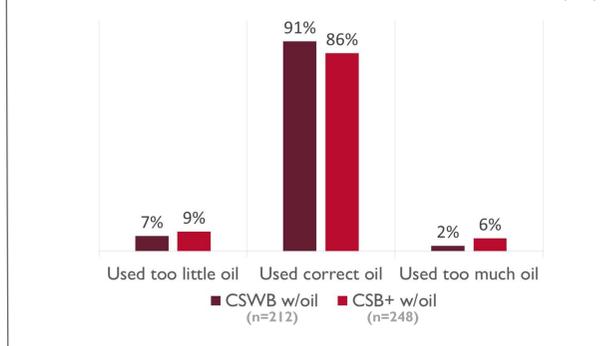
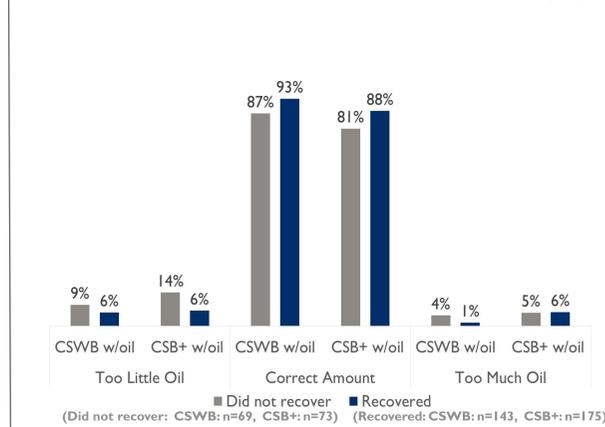


FIGURE 3: COMPARING MEASURED QUANTITY OF OIL (ML)



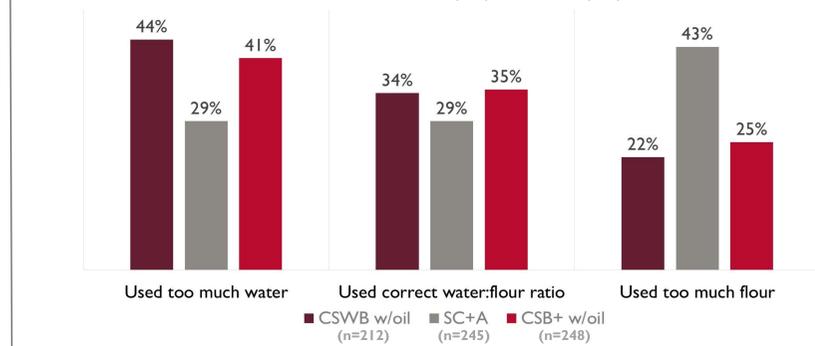
Chi-square test p-value=.11. Contrasting with results in Figures 1 and 5, nearly all respondents reported adhering to preparation protocol for quantity of oil used. Consistent with trends in flour used and flour: water ratio used, reports of quantity of oil used were similar between CSB+ w/oil and CSWB w/oil arms.

FIGURE 4: COMPARING RECOVERED TO FAILED: OIL (ML)



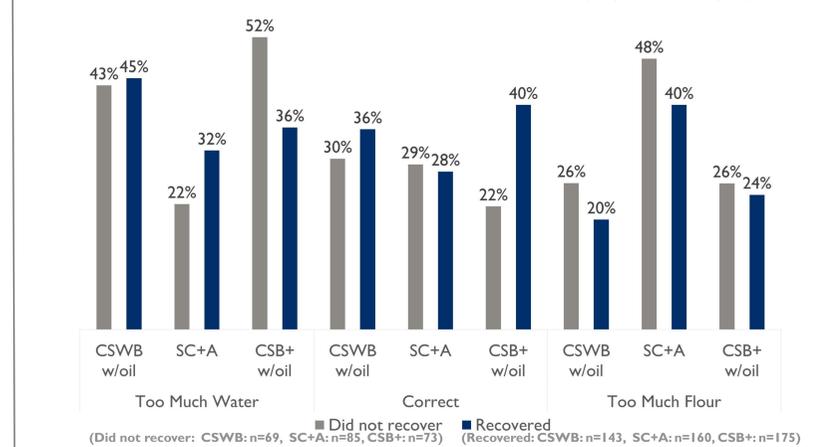
Chi-square test from logistic regression p=.18. As with results in Figure 2, there was no discernible difference between either the CSWB w/oil and CSB+ w/oil or the recovered and not recovered groups.

FIGURE 5: COMPARING MEASURED WATER (ML) : FLOUR (ML) RATIO



Ratios calculated based on independent reports of water and flour (i.e. individual ingredients were reported, not ratios). Chi-square test comparing all three FBFs p-value<.001. Chi-square test comparing only CSWB and CSB+ p-value=.68. Respondents used too much water in CSB+ w/oil and CSWB w/oil (i.e. thinner porridge) compared to SC+A where too much flour was used (i.e. thicker porridge).

FIGURE 6: COMPARING RECOVERED TO FAILED: WATER (ML) : FLOUR (ML) RATIO



Chi-square test from logistic regression p=.21. There appears to be more variation between recovered and not recovered beneficiaries than in Figures 2 or 4, but the difference is not statistically significant.

Summary Conclusions

- Adherence to preparation protocol was not associated with recovery
- Reported adherence to preparation protocol was high for oil use compared to other ingredients suggesting the measurement unit is important in adherence (not reported here)
- Behavior patterns in adherence were consistent between observed and self-reported data implying that patterns in reported adherence behavior are robust for interpretation