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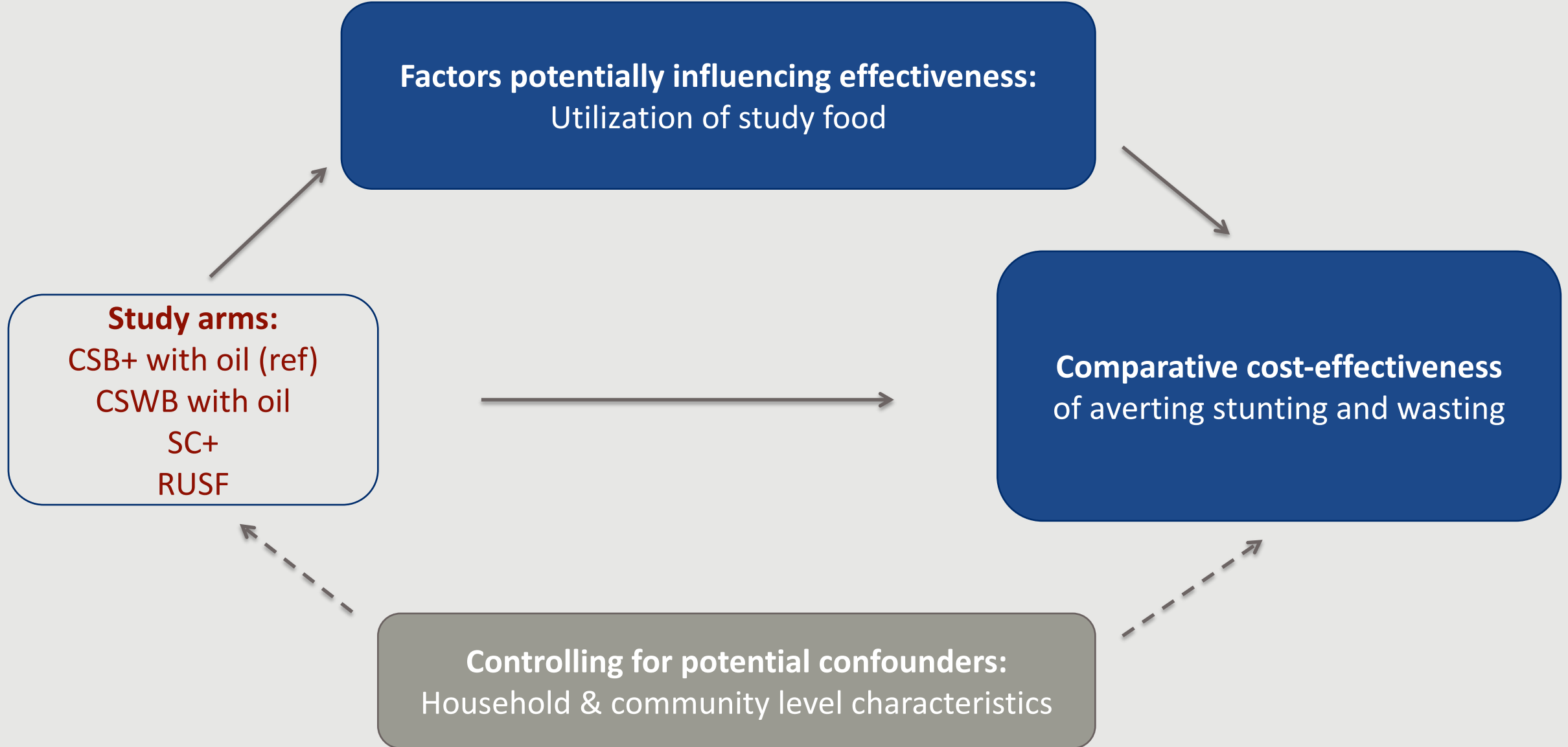
Comparative cost-effectiveness of four supplementary foods in the prevention of stunting and wasting in children 6-23 months in Burkina Faso

Presented by: Ilana Cliffer
Tufts University
November 2018



Are we spending public money wisely in selecting and delivering food assistance for optimal impact?

Study design | Conceptual framework & objectives



Study design | The four supplementary foods

Study Food	Contents
CSB Plus + Oil* (CSB+)	Cornmeal, whole soybeans, vitamin/mineral premix
Corn Soy Whey Blend + Oil* (CSWB)	Cornmeal, soy flour, whey protein concentrate, vitamin/mineral premix
Super Cereal Plus (SC+)	Corn, dehulled soybeans, dried skim milk powder, vitamin/mineral premix
Ready-to-Use Supplementary Food (RUSF)	Oilseeds, tree nuts, pulses, cereals, sugar, dairy protein, vegetable oil, vitamin/mineral premix

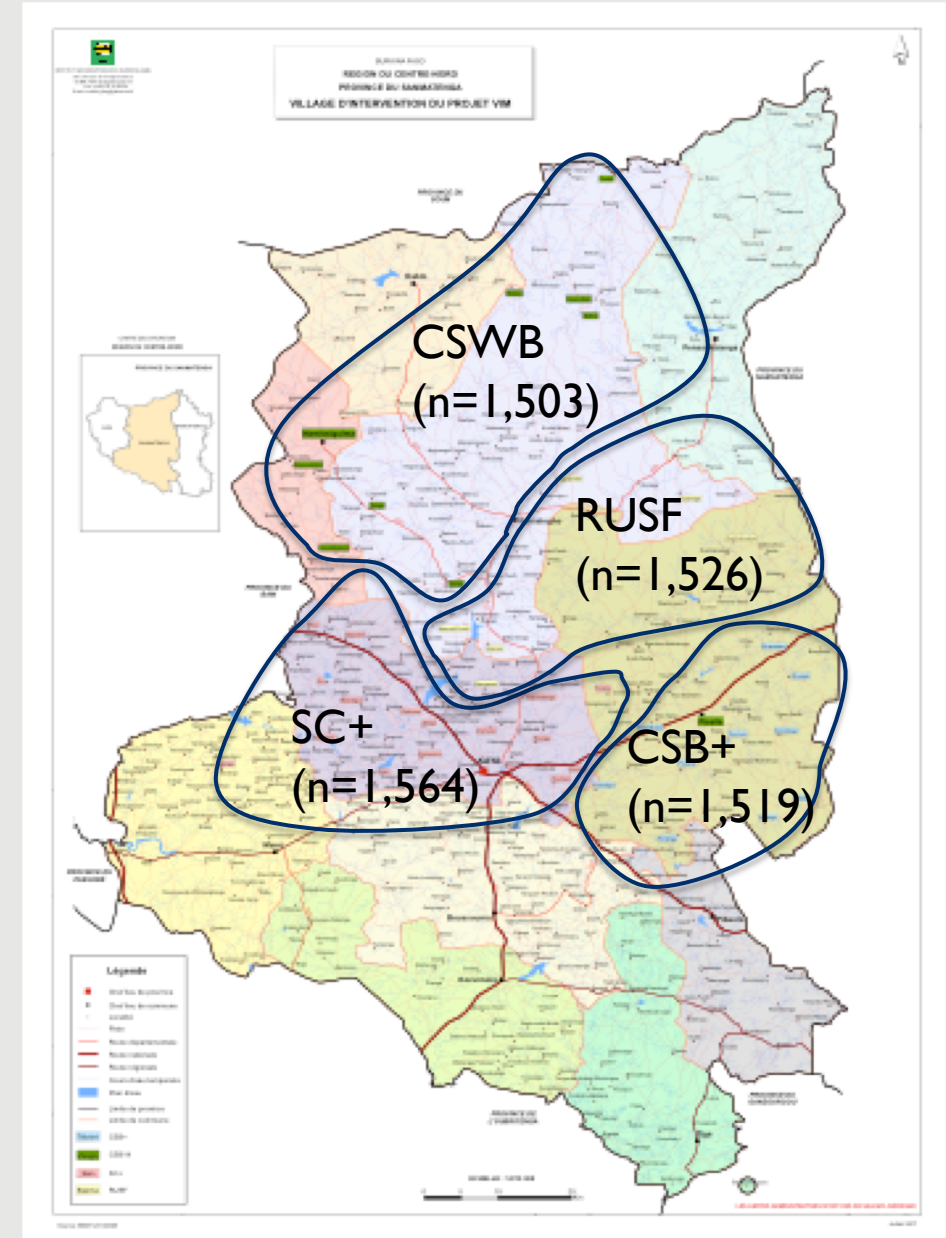
**Fortified with Vitamin A & D*



Monthly ration ~500 kcal/day (as delivered)

Study design | Study setting

- **Title II USAID supplementary feeding program (VIM)** targeting all pregnant and lactating mothers and children 6-23 months in Sanmatenga Province
- **Four geographic regions randomly assigned one of four foods** distributed at 48 distribution sites
- Study arms were comparable in terms of community and household characteristics



Methods | Data collection

Enrollment ~ 6,000 children

Household, SES, and
community level data
collected at enrollment

~6 months of age

Aug. 2014 – Jul. 2015

Followed for 18 months

Monthly anthropometric
data collected at each
food distribution

~18 distributions

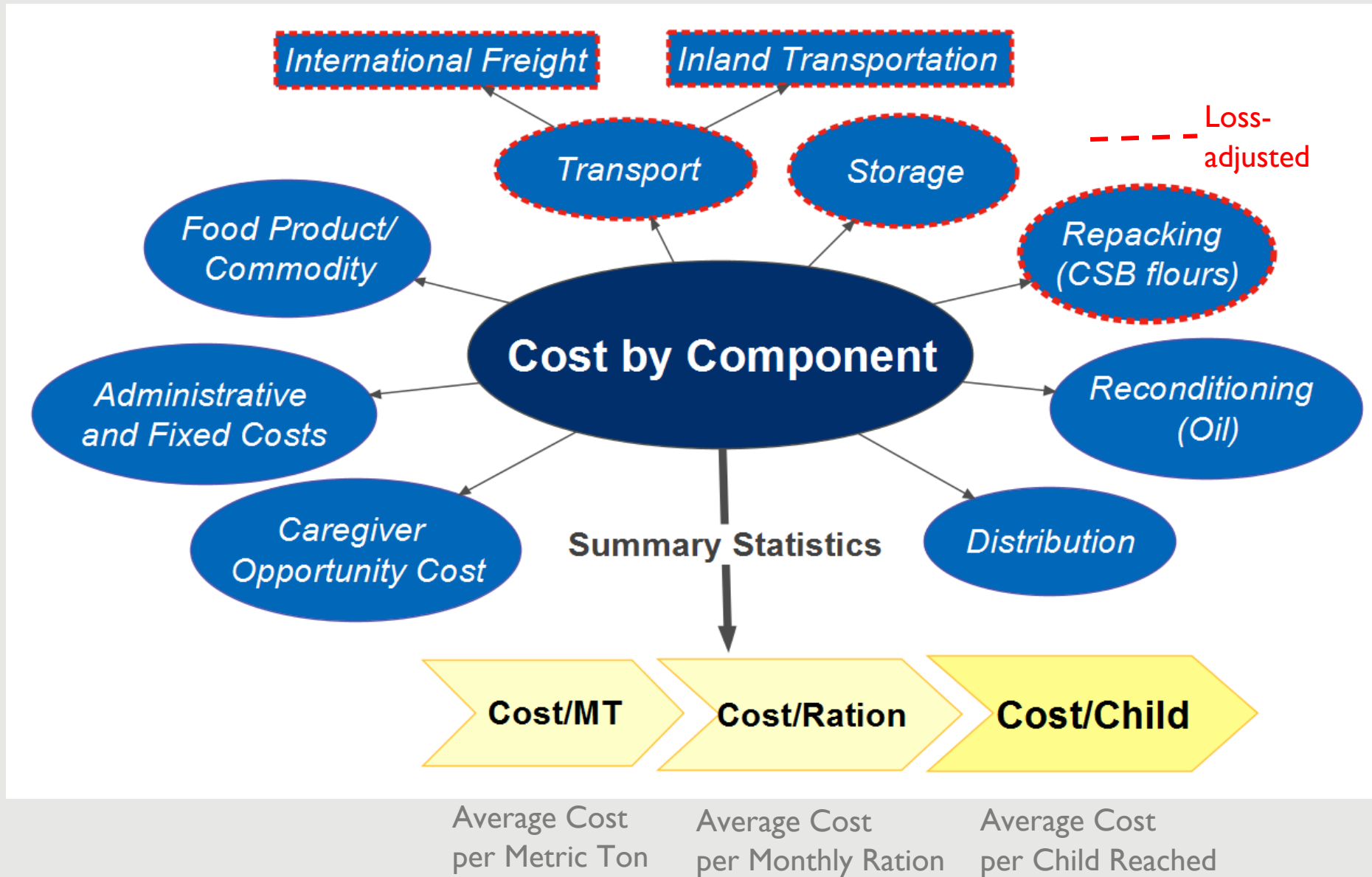
Aug. 2014 – Sept. 2016

Post-intervention follow-up

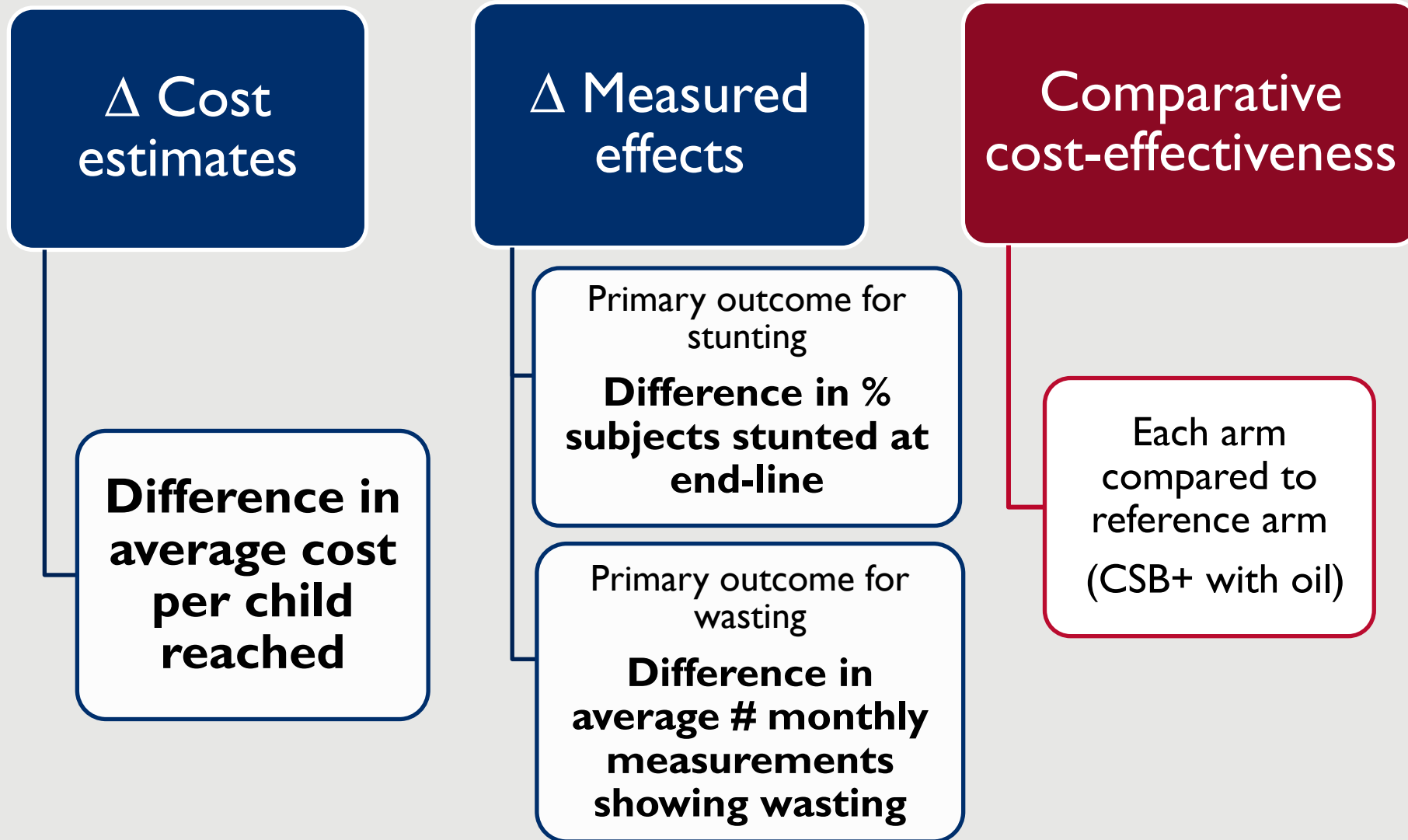
Anthropometric data
collected at 1, 2, and 3
months post food
distribution

Feb. 2016 – Dec. 2016

Methods | Costing data collection



Assessing cost-effectiveness across study arms



Methods | Data analysis

- Prevalence of stunting at end-line
→ *Logistic regression*
- Total number of months wasted
→ *Negative binomial regression*
- Mean LAZ and WLZ throughout study period
→ *Mixed-effects regression*



How do the foods compare in preventing stunting at end-line?

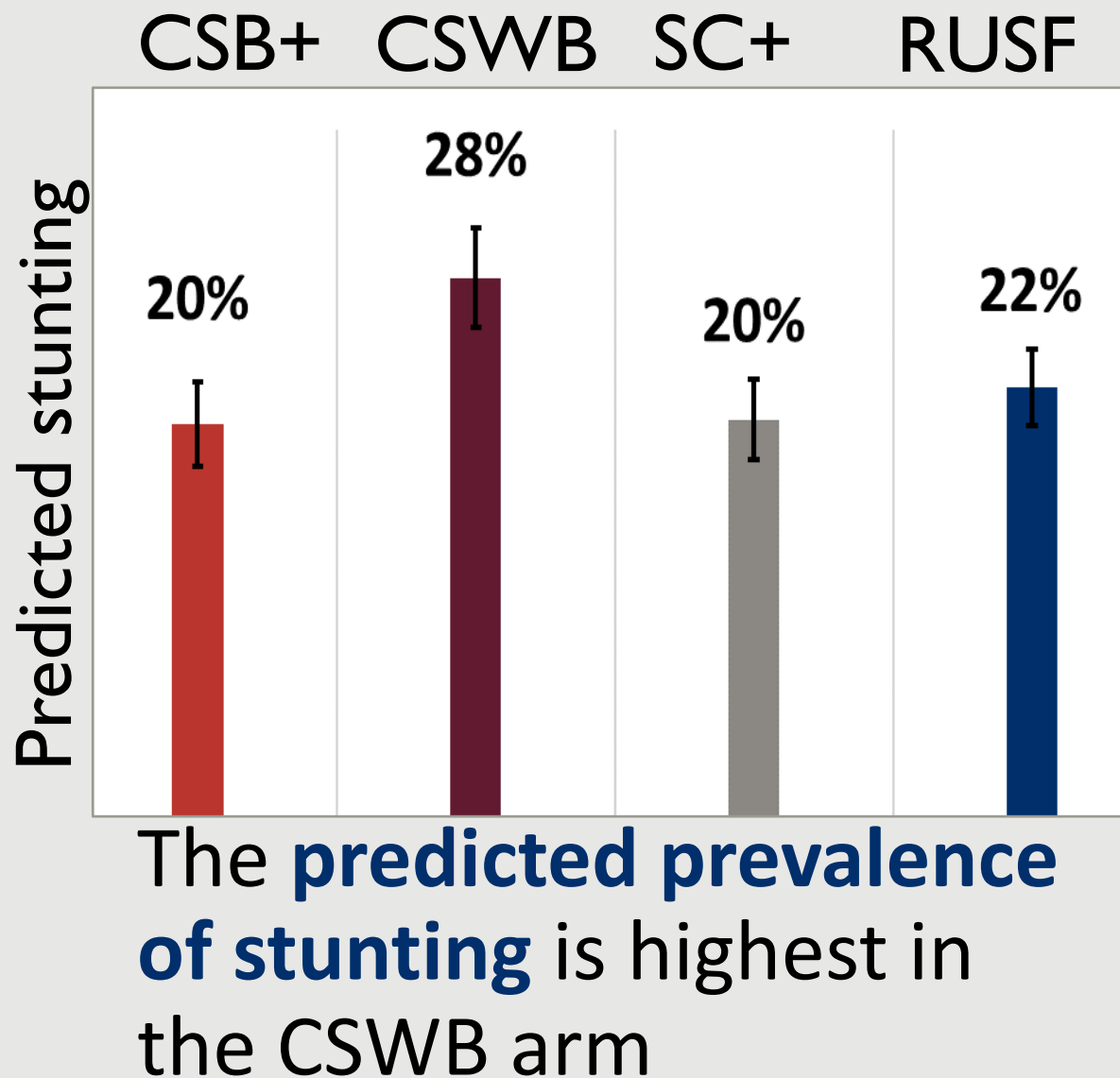
PRELIMINARY RESULTS

Adjusted odds ratios; end-line stunting

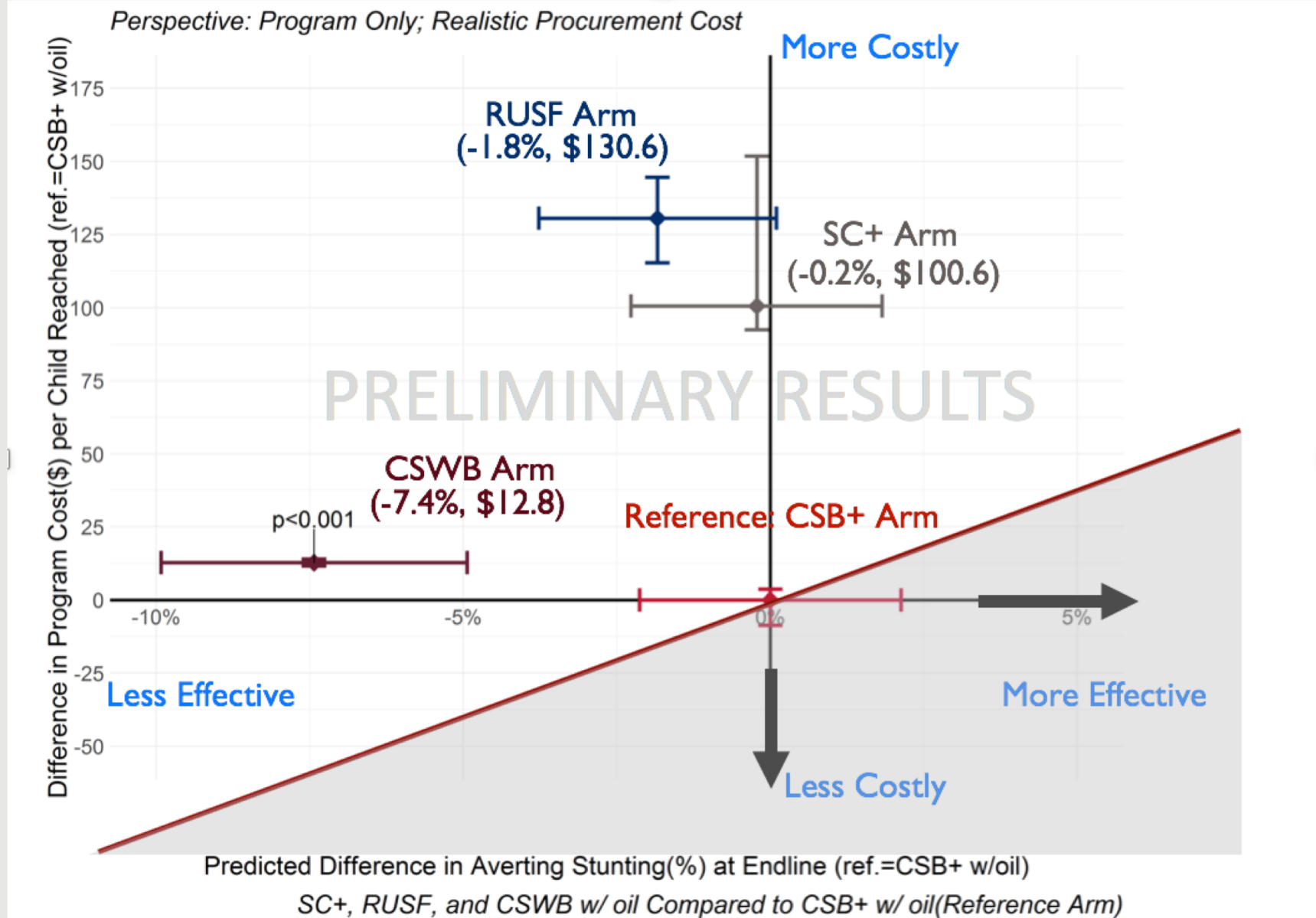
CSB+	CSWB	SC+	RUSF
Ref	2.07*	1.02	1.21

* $p < 0.05$

The **odds of stunting at end-line** were similar in the SC+ and RUSF arms; twice as high in the CSWB arm



Incremental cost-effectiveness plane for stunting prevention



How do the foods compare in preventing wasting?

PRELIMINARY RESULTS

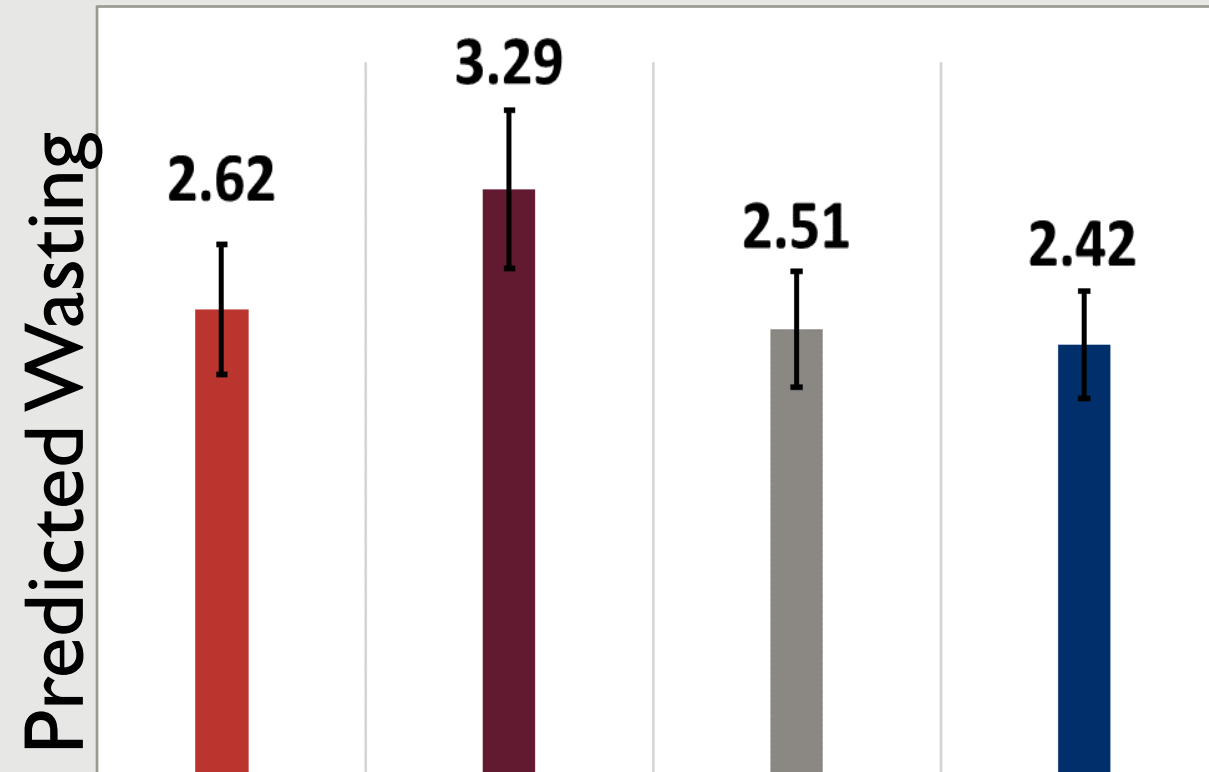
Adjusted incidence rate ratios

CSB+	CSWB	SC+	RUSF
Ref	1.25*	0.96	0.92

*p < 0.05

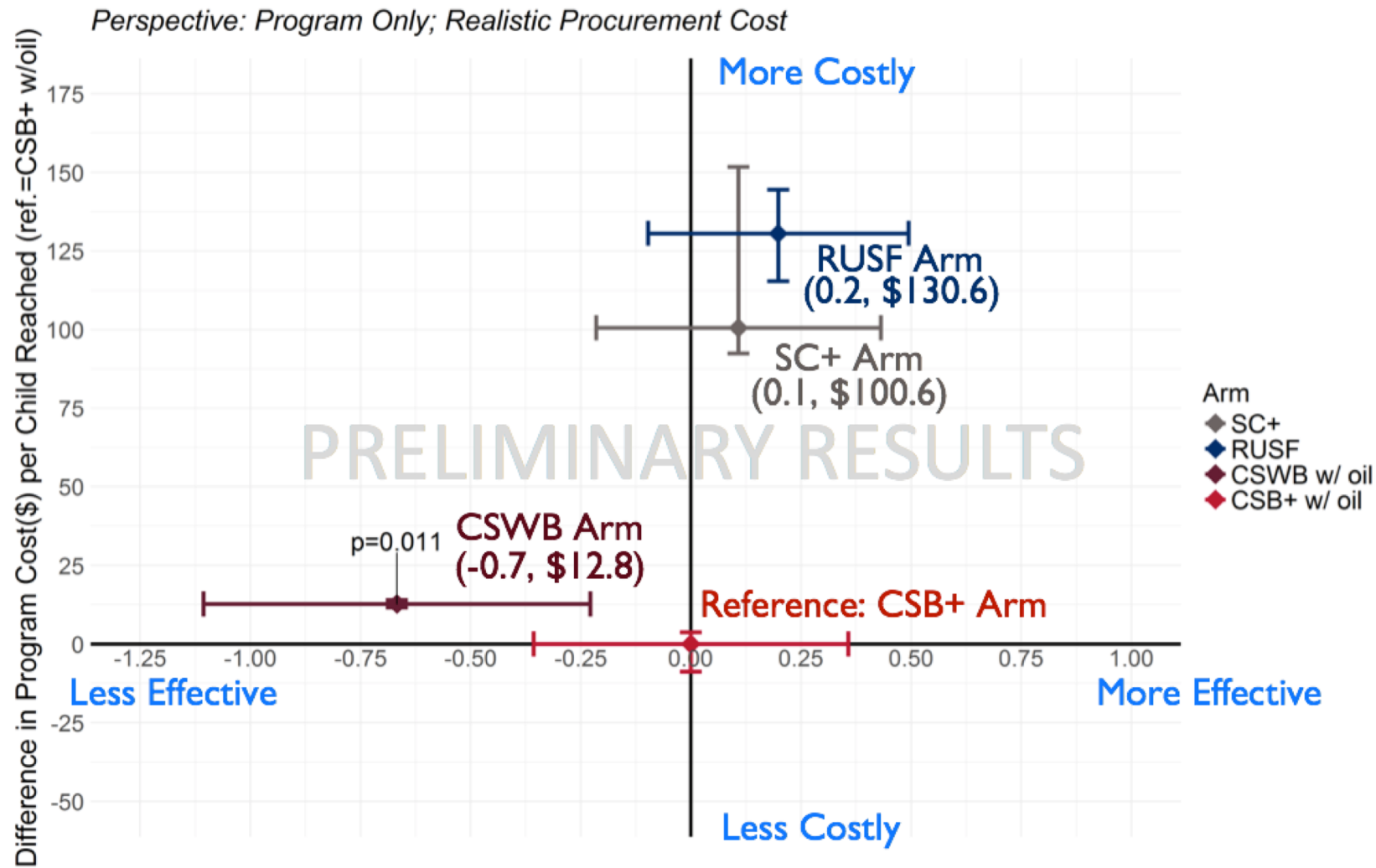
Those in the CSWB arm have **25% more monthly episodes of wasting** than those in the CSB+ arm

CSB+ CSWB SC+ RUSF



The predicted number of monthly measurements showing wasting was similar in the SC+ and RUSF arms, but higher in the CSWB arm

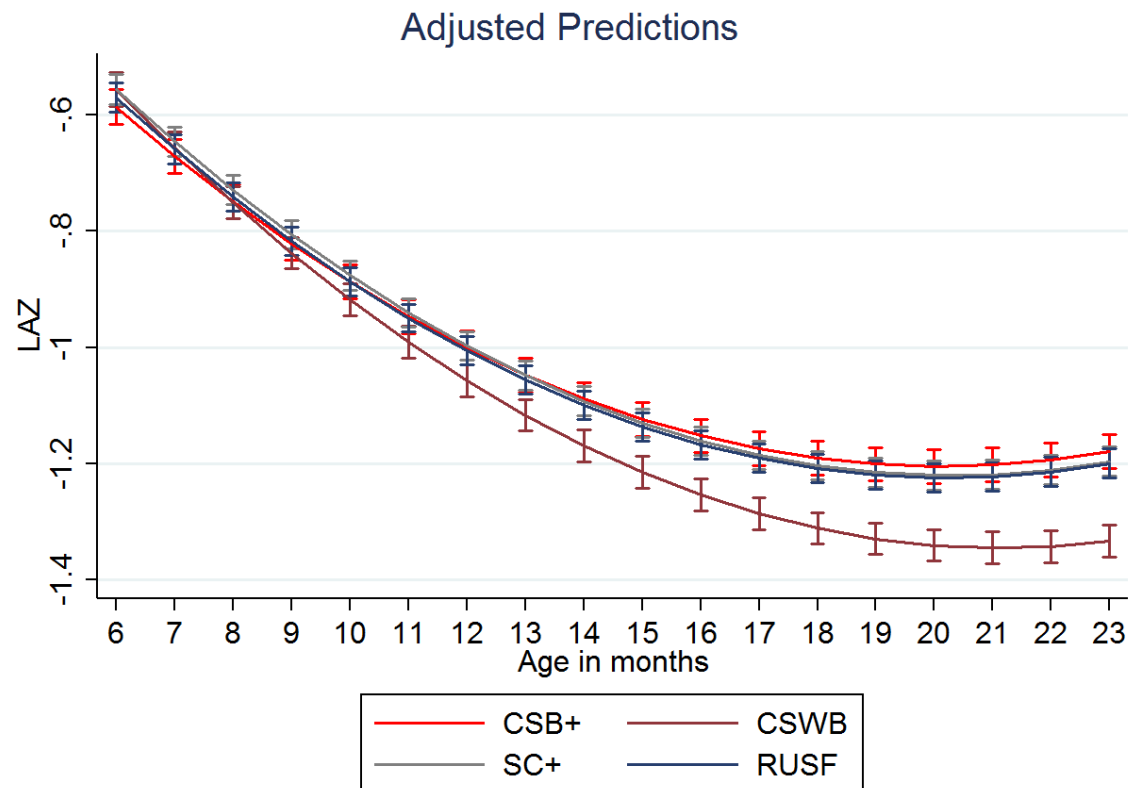
Incremental cost-effectiveness plane for wasting prevention



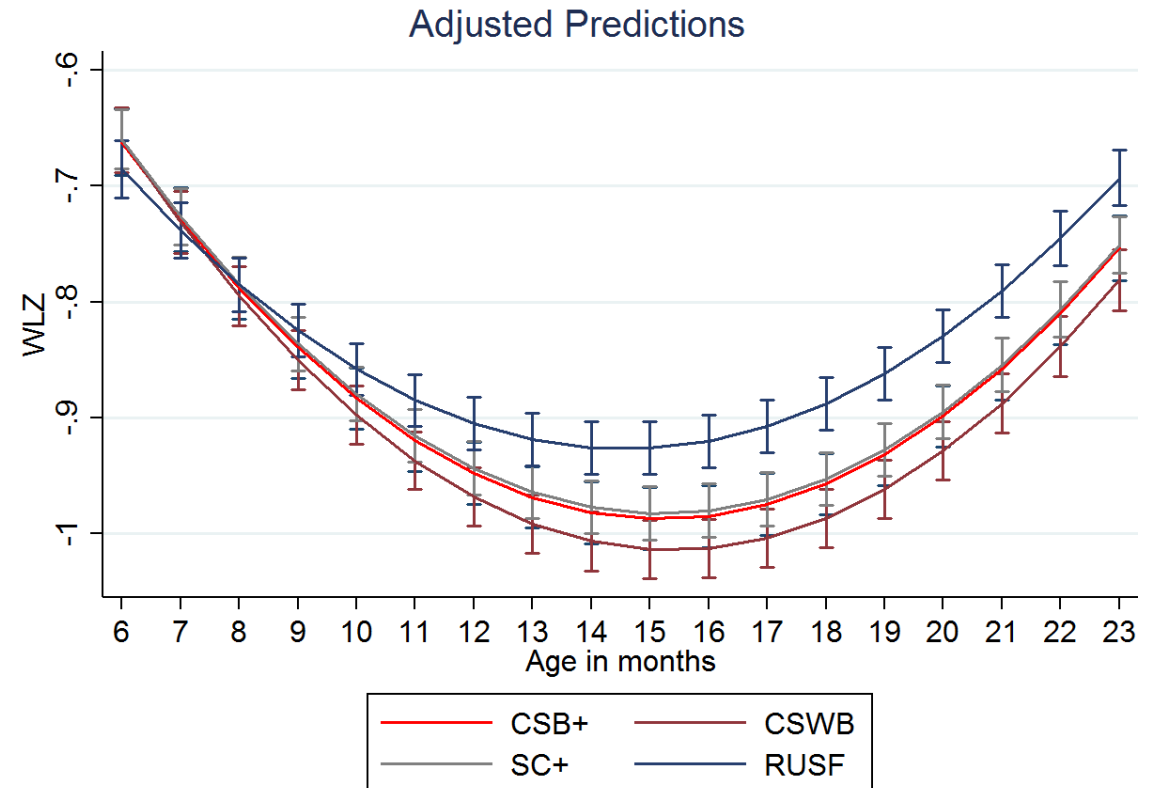
Predicted Difference in Monthly Measurements(months) Showing Wasting per Child (ref.=CSB+ w/oil)
SC+, RUSF, and CSWB w/ oil Compared to CSB+ w/ oil(Reference Arm)

How effective were each of the foods in “preventing” stunting and wasting over time?

LAZ declined in all arms, with greatest decline in the CSWB arm



WLZ trajectories are similar, with the RUSF arm showing a slower rate of decline



Two important questions:

- Why do none of the foods prevent the typical declines in z-scores?
- Why does the food with whey protein and enhanced micronutrient profile perform less well than the other foods?

Perhaps the answer lies in household use of the food products

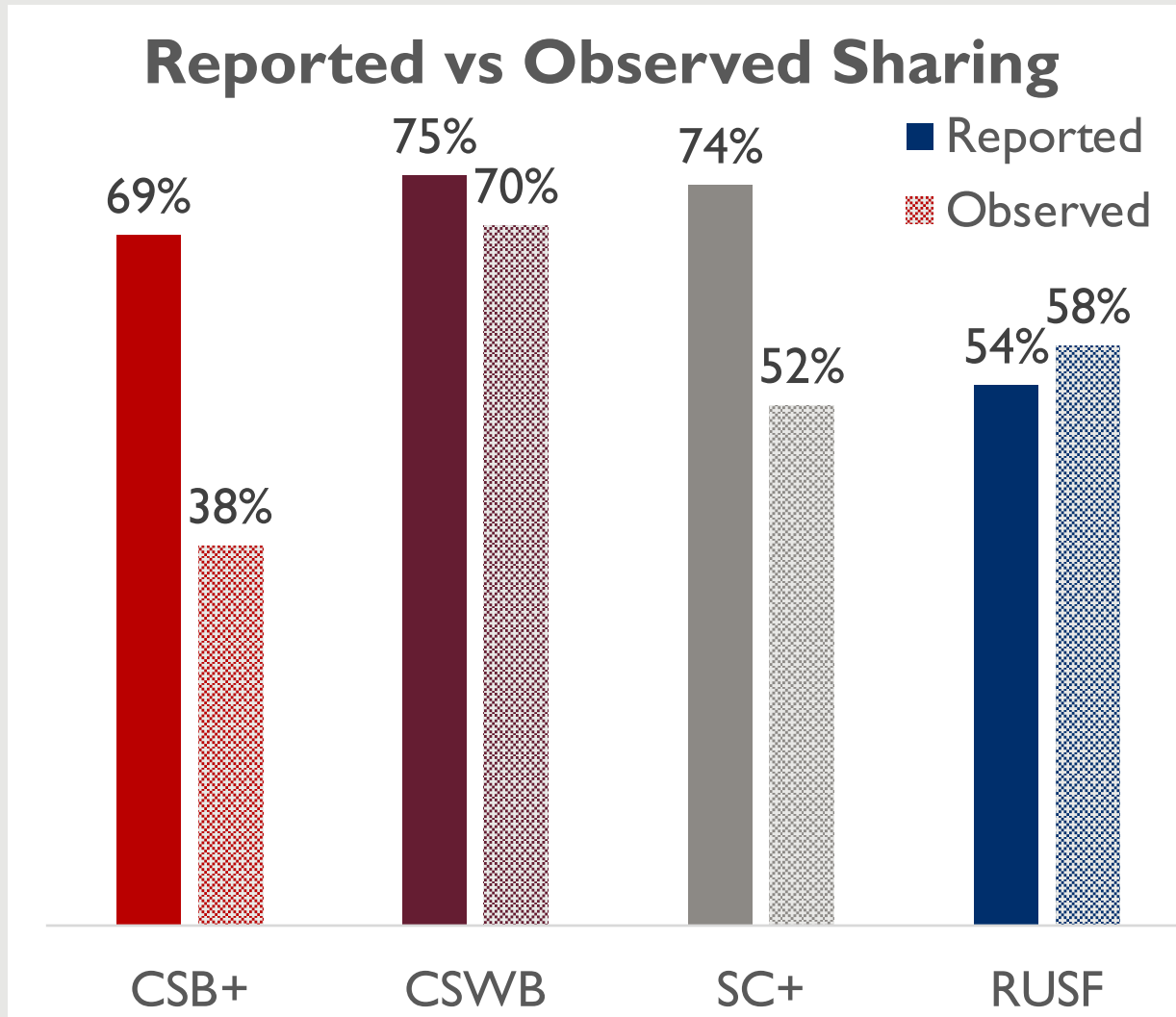
- In-home observations (n=209)
- Individual interviews with beneficiary mothers (n=1,463)
- Focus groups with beneficiary mothers and distribution committees (n=48)
- Lead mother and promoter interviews (n=308)



A young girl with dark skin and short hair is sitting on a blue and white patterned mat. She is wearing a light blue t-shirt and a dark blue skirt with a white floral pattern. In front of her is a large, empty metal bowl. She is looking directly at the camera with a serious expression. The background is a dry, dusty ground.

Is the target beneficiary RECEIVING the food?

High levels of reported and observed sharing



- No selling reported in any study arm
- Giving away any of the ration, 8-13%
- Giving away oil, 7-8%
- 18-21% of people report using oil for other household cooking

Many studies have found similarly high levels of sharing and diversion

Ready-to-use foods for management of moderate acute malnutrition: Considerations for scaling up production and use in programs

Saskia Osendarp, Beatrice Rogers, Kelsey Ryan, Mark Manary, Peter Akomo, Paluku Bahwere, Hilina Belete, Mamane Zeilani, Munirul Islam, Filippo Dibari, and Saskia de Pee



Original Article

Comparison of methods to assess adherence to small-quantity lipid-based nutrient supplements (SQ-LNS) and dispersible tablets among young Burkinabé children participating in a community-based intervention trial

Souheila Abbeddou^a, Sonja Y. Hess^a, Elizabeth Yakes Jimenezⁱ, Jérôme W. Soméⁱⁱ, Stephen A. Vostiⁱ, Rosemonde M. Guissouⁱ, Jean-Bosco Ouédraogoⁱ and Kenneth H. Brown^a



Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Appetite

journal homepage: www.elsevier.com/locate/appet

Evaluation of the acceptability of improved supplementary foods for the treatment of moderate acute malnutrition in Burkina Faso using a mixed method approach

Ann-Sophie Iuel-Brockdorf^{a,b,*}, Tania Aase Draebel^c, Christian Ritz^b, Christian Fabiansen^b, Bernardette Cichon^b, Vibeke Brix Christensen^{b,d}, Charles Yameogo^{b,e}, Rouafi Oummani^f, André Briend^b, Kim F. Michaelsen^b, Per Ashorn^g, Suzanne Filteau^h, Henrik Friis^b

“sharing will happen...consider mitigating measures...”

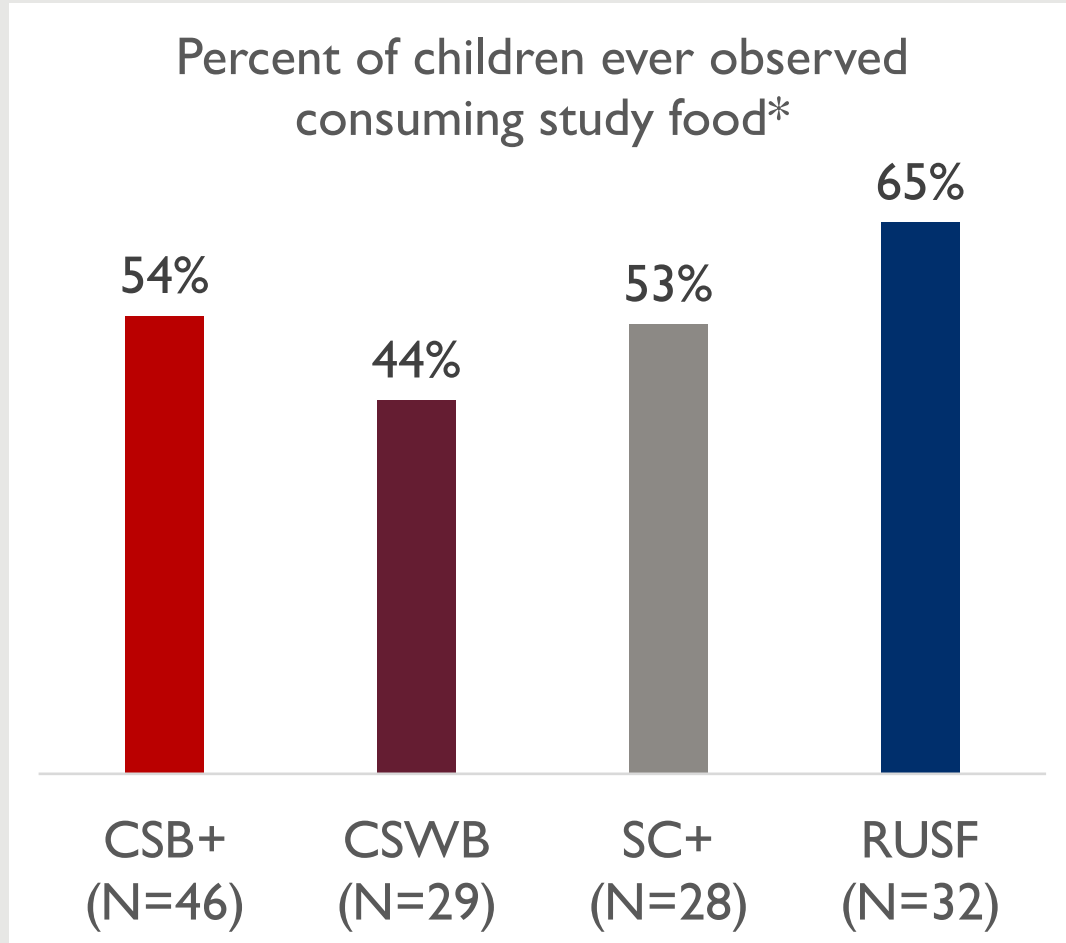
“Frequency of sharing is substantial...”

“More than one third of all observed meals were shared with other household members.”



Is the target beneficiary **CONSUMING the intended quantity of food?**

Foods are not always consumed daily



*Over 4 day observation period, when food was present in the household



Children in other studies also do not consume the intended quantity of supplementary foods



The Journal of Nutrition
Community and International Nutrition

Malawian Mothers Consider Lipid-Based Nutrient Supplements Acceptable for Children throughout a 1-Year Intervention, but Deviation from User Recommendations Is Common¹⁻³

Ulla Ashorn,^{4*} Lotta Alho,⁴ Mary Arimond,^{5,6} Kathryn G Dewey,^{5,6} Kenneth Maleta,⁸ Nozgechi Phiri,⁹ John Phuka,⁸ Stephen A Vosti,⁷ Mamane Zeilani,¹⁰ and Per Ashorn^{4,11}



Contents lists available at [ScienceDirect](#)

Appetite

journal homepage: www.elsevier.com/locate/appet

Research report

Acceptability of new formulations of corn-soy blends and lipid-based nutrient supplements in Province du Passoré, Burkina Faso [☆]

Ann-Sophie Iuel-Brockdorf ^{a,b,*}, Tania Aase Dræbel ^c, Christian Fabiansen ^b,
Bernardette Cichon ^{a,b}, Vibeke Brix Christensen ^{b,d}, Charles Yameogo ^{b,e}, Christian Ritz ^b,
Mette Frahm Olsen ^f, Henrik Friis ^b

“...children receiving supplements through a program are likely to consume less than the intended dose of the LNS...”

“58% of participants receiving CSB reported having left-overs at the end of the day compared to 37% of the participants receiving LNS, suggesting that CSB was not as readily consumed as LNS.”

Consumption may be influenced by taste

“Usually, if we make it, the **child refuses to eat it**, and if we taste it, we find out it’s **bitter...**”

“Last month, the flour they gave us could not be used, besides giving it to the animals. **Even the animals don’t want it. It’s very bitter.**”

“Often, there are insects inside, and if we taste it, we find that it’s too bitter-tasting. We can’t use it to make porridge or couscous. **We can only throw it out.**”



Professional tasters agree that the CSWB was bitter after 10+ months of storage in Burkina

Shortened Table: Sensory profiles of protein blends; Dry powders (as-is)

Attribute	New lot 1	New lot 2	Stored lot 1	Stored lot 2
Sweet taste	2.5	2.3	1.1	1.0
Bitter taste	1.8	2.2	2.6	2.3
Aftertaste	clean	clean	Stale, cardboard, heat exposure	Stale, cardboard, heat exposure

Attributes are scored on a 15 point universal intensity scale. Most dried ingredient attributes fall between 0 and 4. Analyses by NC State

NC State University
Food Science Department
Sensory Service Center

When storage time was not considered, studies have previously shown CSB with animal protein (milk) to be less bitter

Sensory characteristic of corn soya blend and the effects of milk protein replacement

Ursula Kehlet¹, Pernille Kæstel^{1*}, Helene Hausner², Wender L. P. Bredie² and Bodil H. Allesen-Holm²

“CSB porridges with milk proteins had an overall sweet taste and were not perceived as bitter. Substitution of soya flour with the two different milk proteins increased the sweet taste significantly.”



ELSEVIER

Contents lists available at [ScienceDirect](#)

Appetite


journal homepage: www.elsevier.com/locate/appet

Research report

Acceptability of new formulations of corn-soy blends and lipid-based nutrient supplements in Province du Passoré, Burkina Faso [☆]

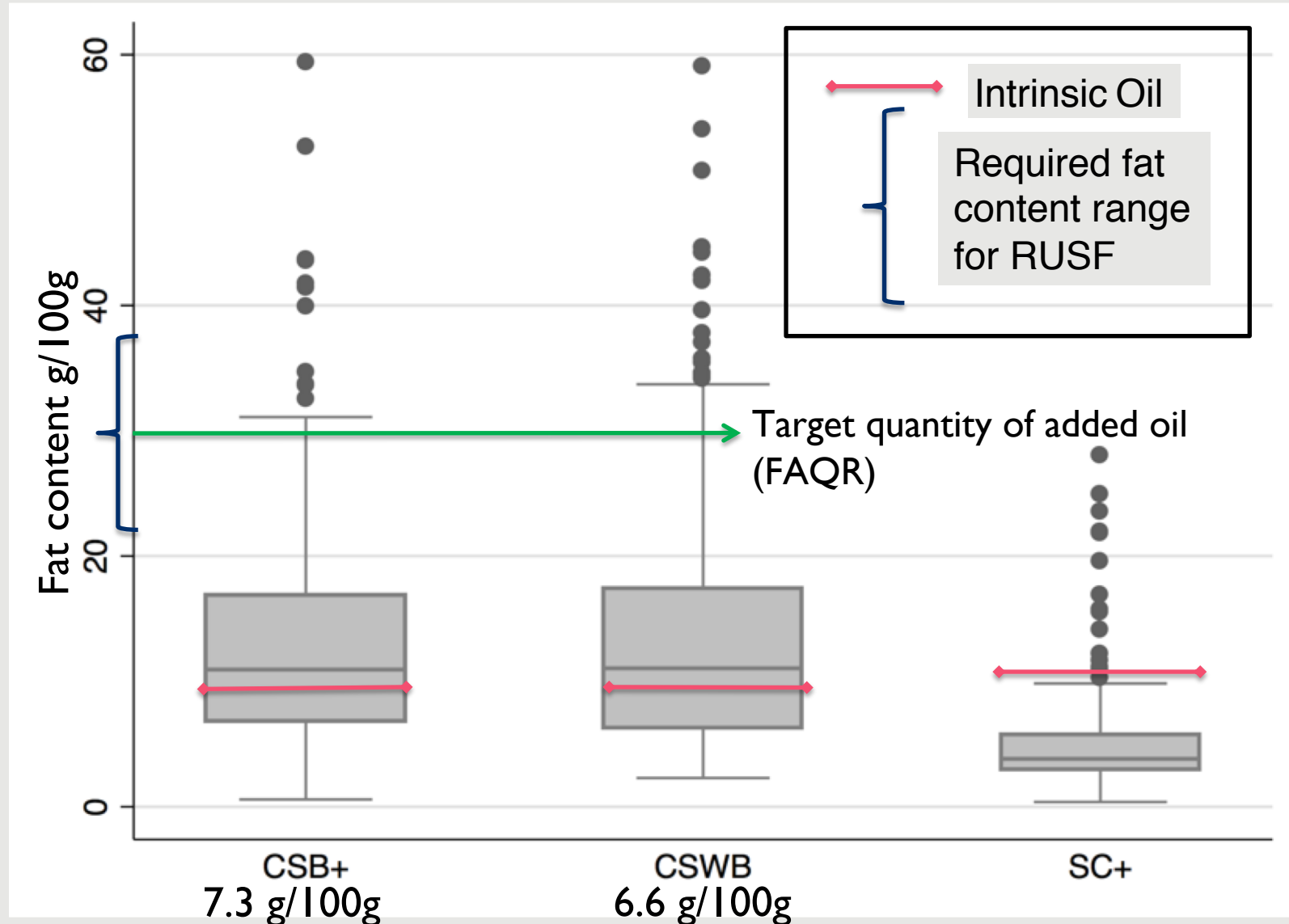
Ann-Sophie Iuel-Brockdorf ^{a,b,*}, Tania Aase Dræbel ^c, Christian Fabiansen ^b,
Bernardette Cichon ^{a,b}, Vibeke Brix Christensen ^{b,d}, Charles Yameogo ^{b,e}, Christian Ritz ^b,
Mette Frahm Olsen ^f, Henrik Friis ^b

“Products with higher milk content received higher ratings”



Are beneficiary caregivers **PREPARING the
foods as intended?**

Samples indicate lower fat content than would be expected if porridge prepared according to recommendations



Average qty added

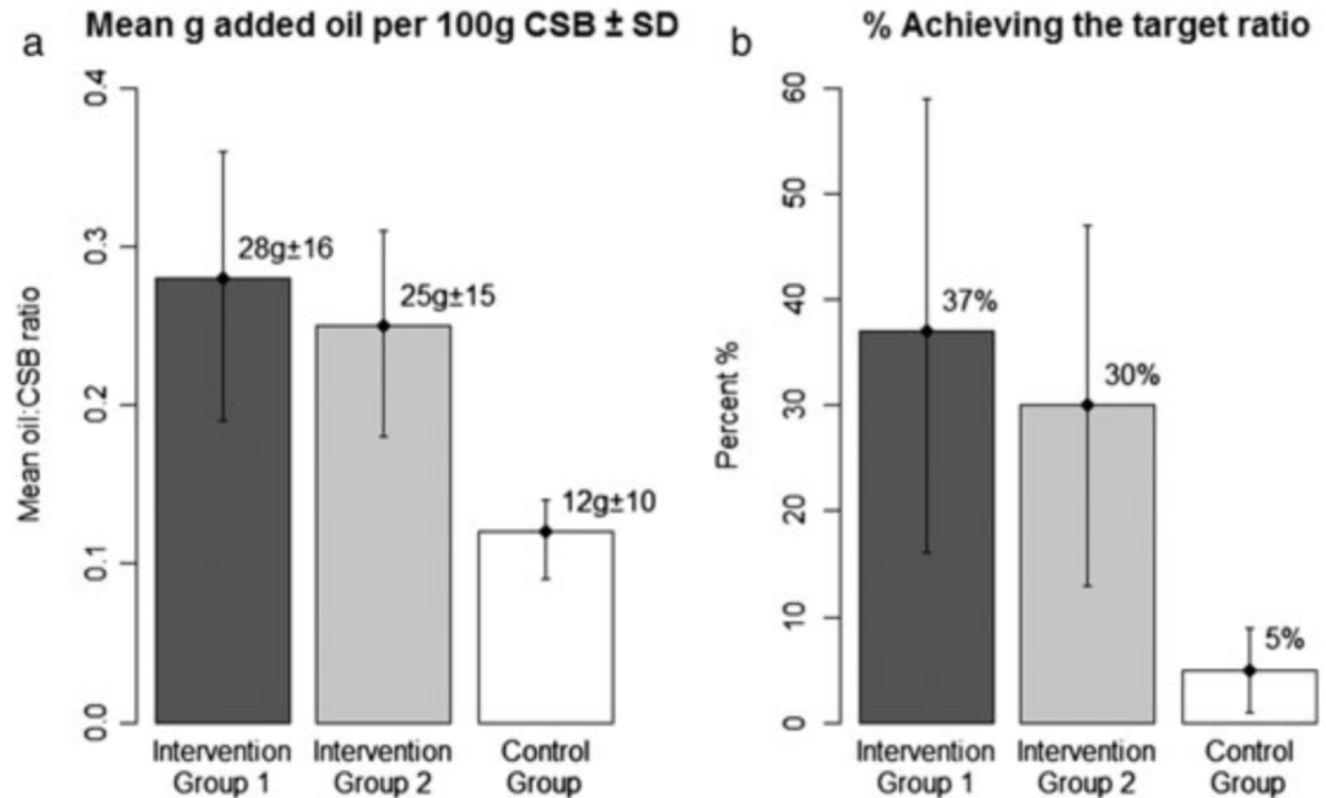
Results from Malawi trial show that targeted SBCC can increase adherence to preparation recommendations

FIGURE 1 Mean g added oil per 100 g CSB (oil:CSB ratio) and percent of caregivers meeting or exceeding the target ratio (30:100) by study group^{a, b, and c}

^a Abbreviations: CSB, corn soy blend

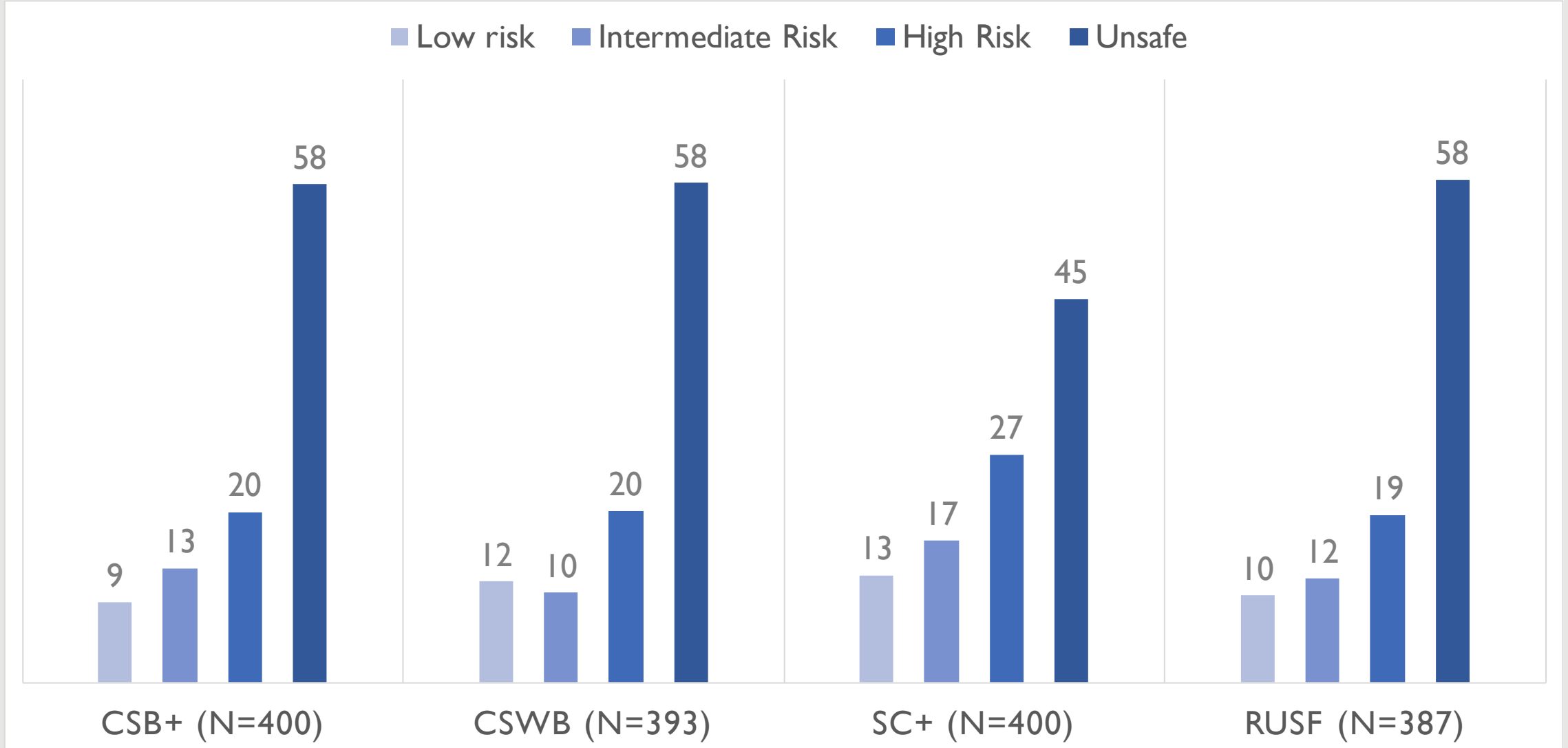
^b The error bars represent 95% CIs, adjusted for clustering at the FDP level

^c Sample sizes by group are as follows: $n = 142$ for intervention group 1; $n = 156$ for intervention group 2; and $n = 157$ for the control group



Rogers et al, 2017

In all study arms, the majority of household water samples showed unsafe or high-risk contamination with E.coli



What have we learned?

1. Overall, the CSB+, RUSF and SC+ arms showed similar effectiveness but carried different costs, making the CSB+ arm the most cost-effective re: stunting at end-line and number of wasted months.
2. The CSWB arm was least cost-effective.
3. None of the foods prevented declines in LAZ or WLZ over time. The CSWB arm showed a steeper decline in LAZ, and the RUSF arm showed a more shallow decline in WLZ.
4. Sharing of foods was common in all arms, but children in the CSWB arm seemed least likely to be consuming adequate product, which may explain the relatively poor effectiveness in the CSWB arm.
5. Quality of **programming and household use of the food products matter at least as much as the composition of products** being programmed.

Thank you for the collaboration!

- **USAID:** Funder
- **Tufts University:** Beneficiary of Food For Peace/USAID grant for food aid research
- **Institut de Recherche en Sciences de la Santé (IRSS):** Research implementation partner
- **ACDI/VOCA:** Prime awardee implementing Title II program, Victoire sur la Malnutrition (ViM).
- **Save the Children:** Sub-prime in consortium implementing the ViM program
- **Study participants** from Sanmatenga Province, Burkina Faso
- **Industry partners** who produce the foods



Acknowledgements

- **Institut de Recherche en Sciences de la Santé (IRSS)**

- Dr. Laetitia Nikiema Ouedraogo
- Dr. Augustin Zeba
- Dr. Hermann Lanou
- Dr. Franck Garanet
- Benoit Sawadogo
- IRSS data collection teams!

- **Tufts University Friedman School of Nutrition**

- Prof. Beatrice Rogers
- Prof. Patrick Webb
- Adeline Kologo
- Breanne Langlois
- Devika Suri
- Ye Shen
- Shelley Walton
- Lindsey Green





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This work was made possible through support provided by the Office of Food For Peace, Bureau for Democracy, Conflict, and Humanitarian Assistance, U.S. Agency for International Development, under the terms of Contract No. AID-OAA-C-16-00020. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of the U.S. Agency for International Development.

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