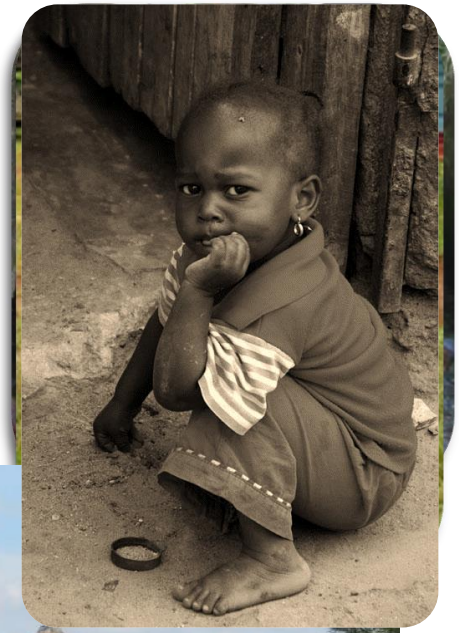
WASH Benefits Kenya

Presented by: Clair Null, Ph.D.

Aug. 30, 2018

Context (baseline data)



- One or more ***households*** live in a ***compound***
  - Shared common yard and sanitation facility
- Majority rely on springs for drinking water
  - Nearly all contaminated with *E. coli*
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  - Materials rarely available at key locations
- Geophagia is common; exclusive breastfeeding is not
  - 20% of children & 31% of pregnant women ate soil on day of survey

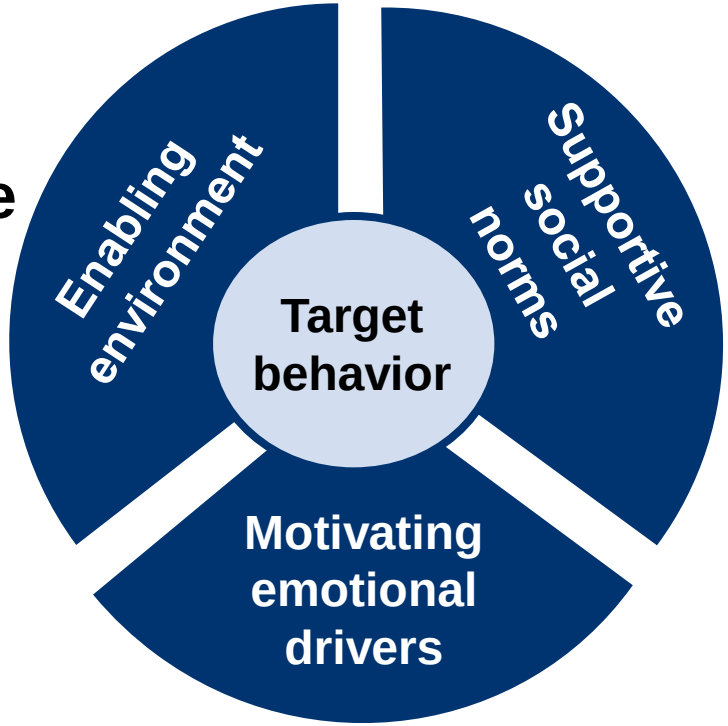
Target behaviors

Water	Treat drinking water with chlorine (sodium hypochlorite).
Sanitation	Use latrines for defecation and safely dispose of feces.
Handwashing	Wash hands with soap before handling food and after defecation.
Nutrition	Practice UNICEF guidelines for maternal, infant, and young child feeding.

- Dietary diversity during pregnancy and lactation
- Early initiation of breastfeeding
- Exclusive breastfeeding until 6 months
- Introduction of appropriate and diverse complementary foods at 6 months
- Continued breastfeeding through 24 months

Formative research suggested that the health benefits of the target behaviors were already well understood, but this knowledge was not sufficient to lead to action.

Behavior change strategy



Convenience

Engage compounds & communities

Nurture, aspiration, self-efficacy

7 trials in one: Double-sized **active control arm** and also single-sized **passive control arm** to test for effects of visits independent of WASH and nutrition interventions.

Monitoring system: Data on key intervention components among a random sample of households (>20%) at 2, 6, 10, and 19 months interventions began.

Promoters

- Community members nominated by study participants
  - Monthly compensation ~$15 plus phone & shirt
  - Intervention materials
- Trained and supported by study staff
  - 3-7 days of initial training
  - Refresher trainings every 6-months
  - Ongoing phone contact with study staff and supportive supervision visits

- Monthly visits
  - Active control: measure mid-upper arm circumference (MUAC)
  - Intervention arms: MUAC, educate, encourage behaviors, hardware support

Intervention materials

Chlorine dispensers: ~5 / cluster

Water

Bottled chlorine: all HHs in study compounds

All Intervention Arms

Promoters: flip charts & summary sheets

Participants: calendars, cue cards, tracking booklets

Handwashing

2 / compound (latrine & cooking) + soap refills

Sanitation

In study compounds:

Slabs – one per compound

New Latrines – one per qualifying compound

Potties – all mothers of U3s

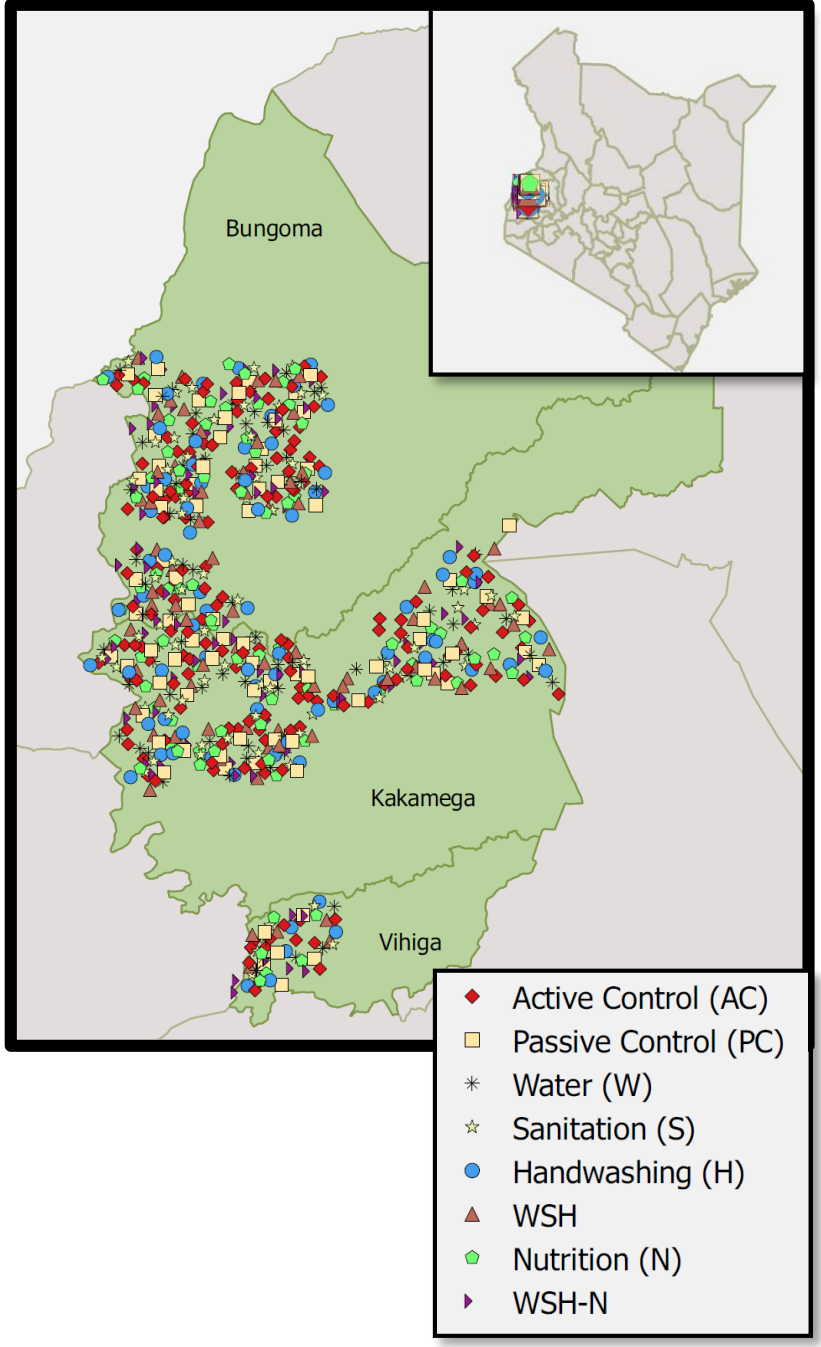
Kipupuus – all mothers

Nutrition

Index children 6-24 mo. + age-eligible siblings

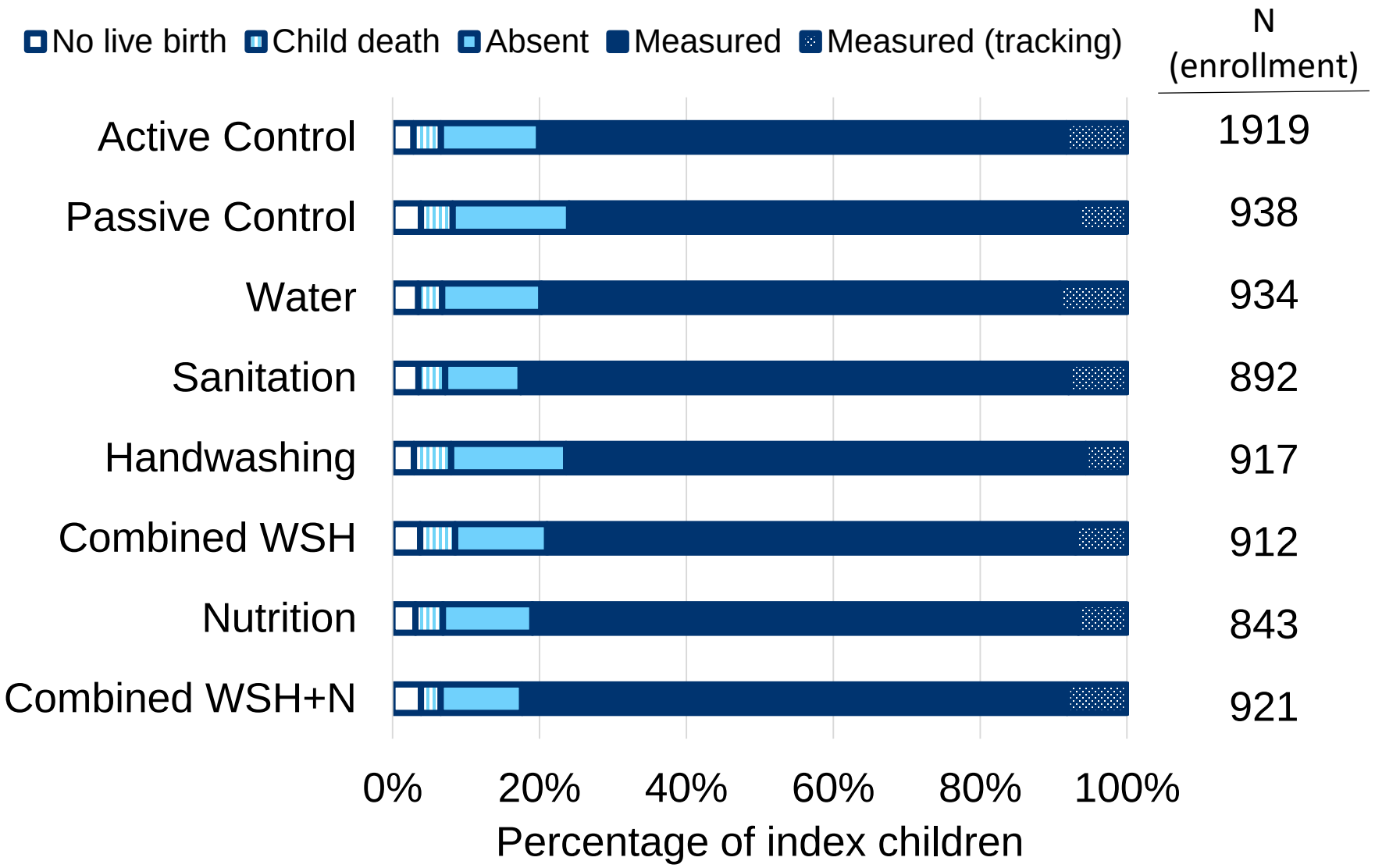
Enrollment

- Bungoma, Kakamega, and Vihiga Counties
  - 1226 villages
- Cluster formation
  - ≥6 pregnant women
  - 1-3 neighboring villages
- 8246 women across 702 clusters
  - Nov. 2012 - May 2014

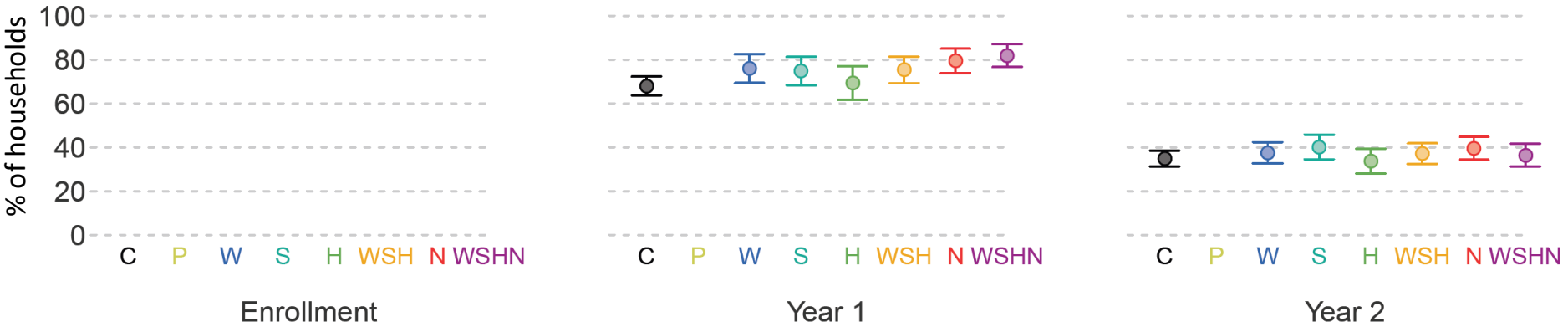


Sample size and loss to follow-up

85% of living children measured at Year 2

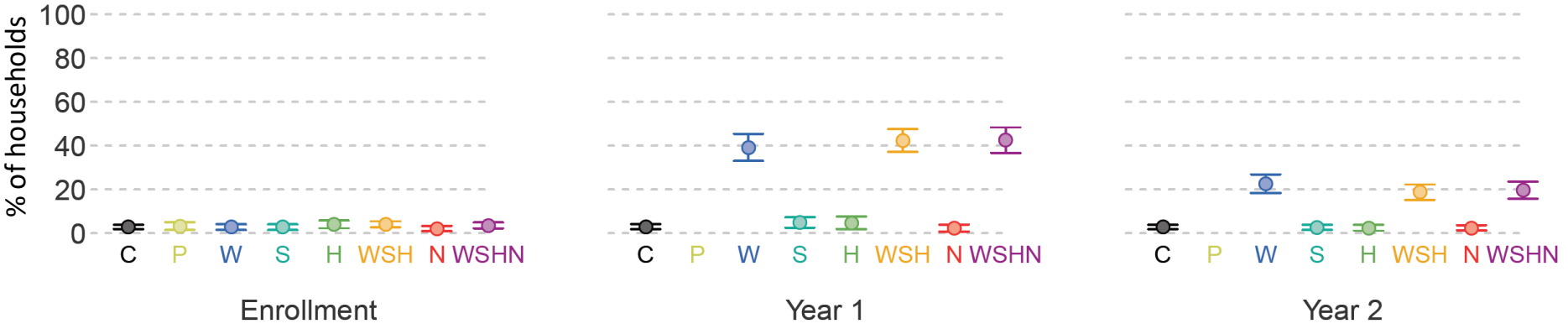


Visited by promoter in past month



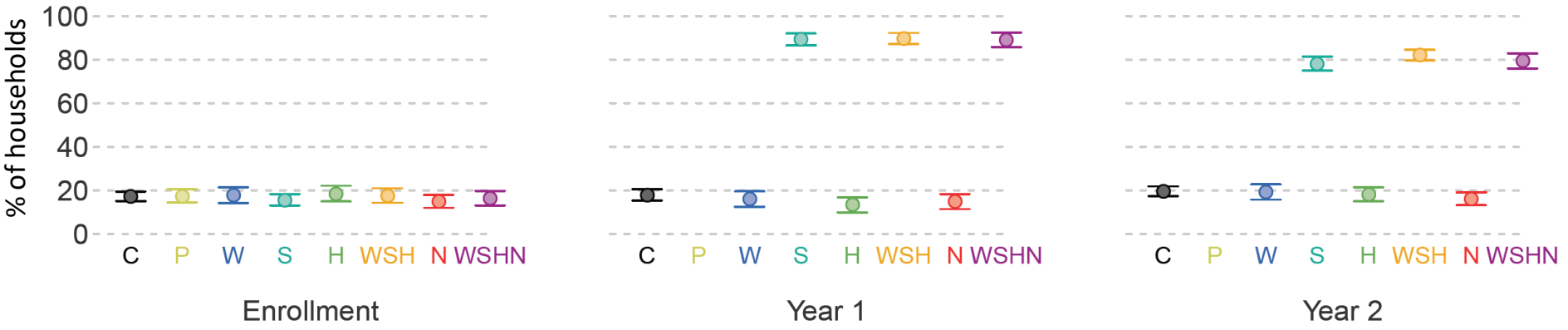
Project monitoring data suggest that ***the frequency of visits had fallen***, but that ***the majority of households were still being visited at least every other month*** by their promoters during the second year of intervention.

Stored drinking water has detectable free chlorine



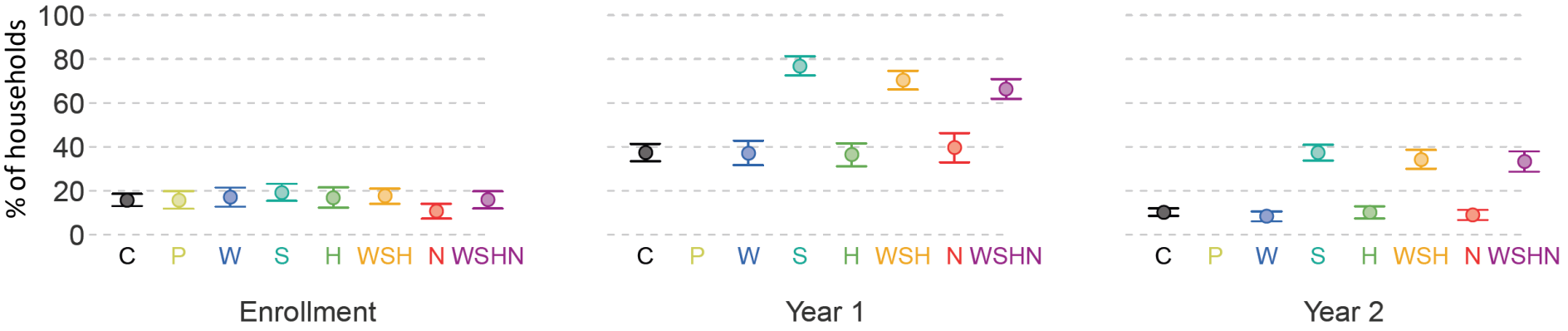
Supply problems do not explain the low take-up of chlorine.
Bottled chlorine was observed in >70% of treatment households in every monitoring round.

Access to an improved latrine



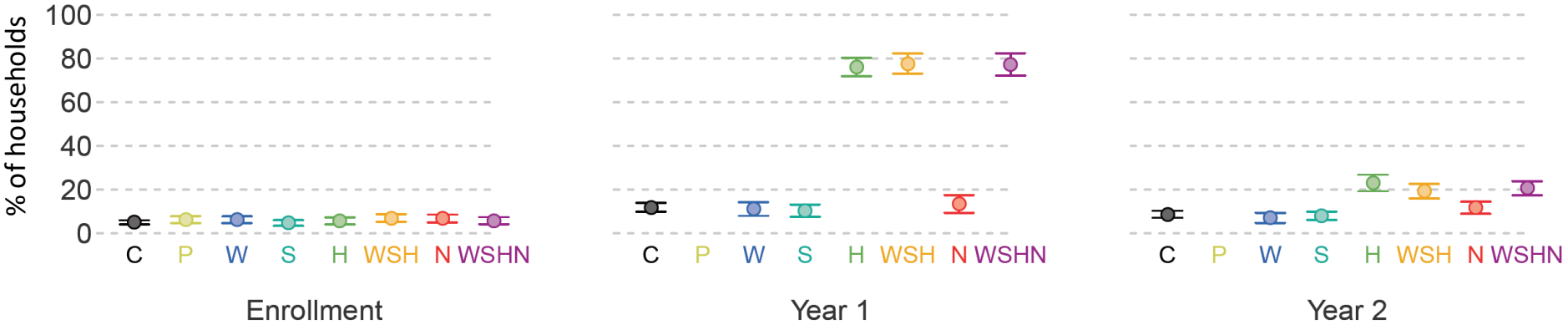
>80% of households owned a latrine at baseline,
but less than a quarter of those were ***improved*** (by JMP standards).
Almost all adults report using a latrine for defecation.

Child feces safely disposed



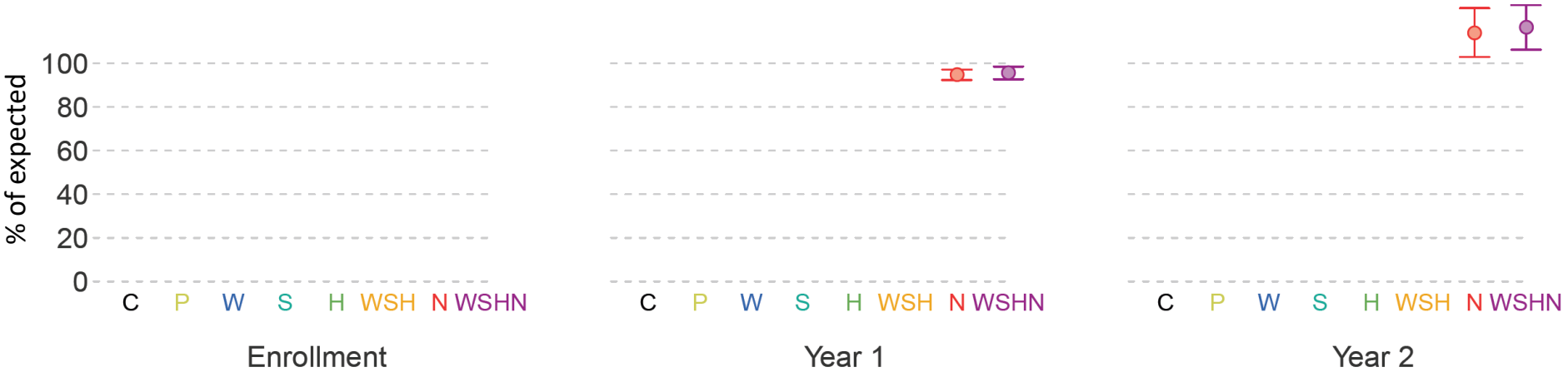
Defecation behaviors change as the child ages –
the decrease in safe disposal in all arms suggests that caregivers have more control over disposal of a one-year-old's feces (relative to a two-year-old's).

Handwashing location has water and soap



Monitoring data from month 19 suggest that low adherence was not due to hardware problems.

LNS sachets consumed

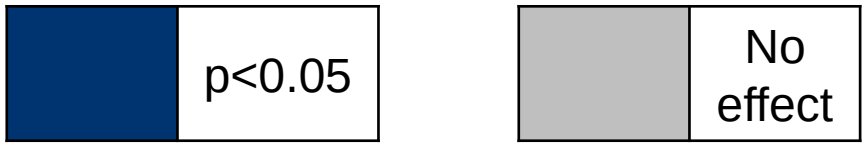


Consumption > 100% is possible because households were given a few extra sachets each month as a buffer in case the next delivery was delayed.

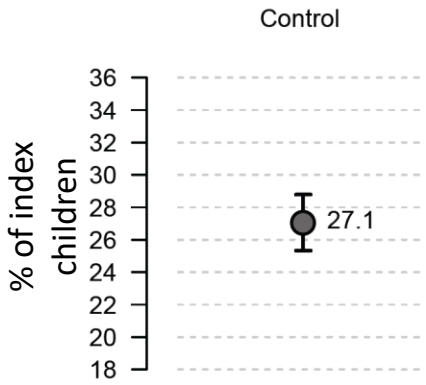
Environmental Contamination

Amy Pickering, Tufts University

	W	S	H	WSH
Stored water (*E. coli)*		--		
Child hands (*E. coli)*	--	--	--	
Sentinel toys (*E. coli)*	--	--	--	

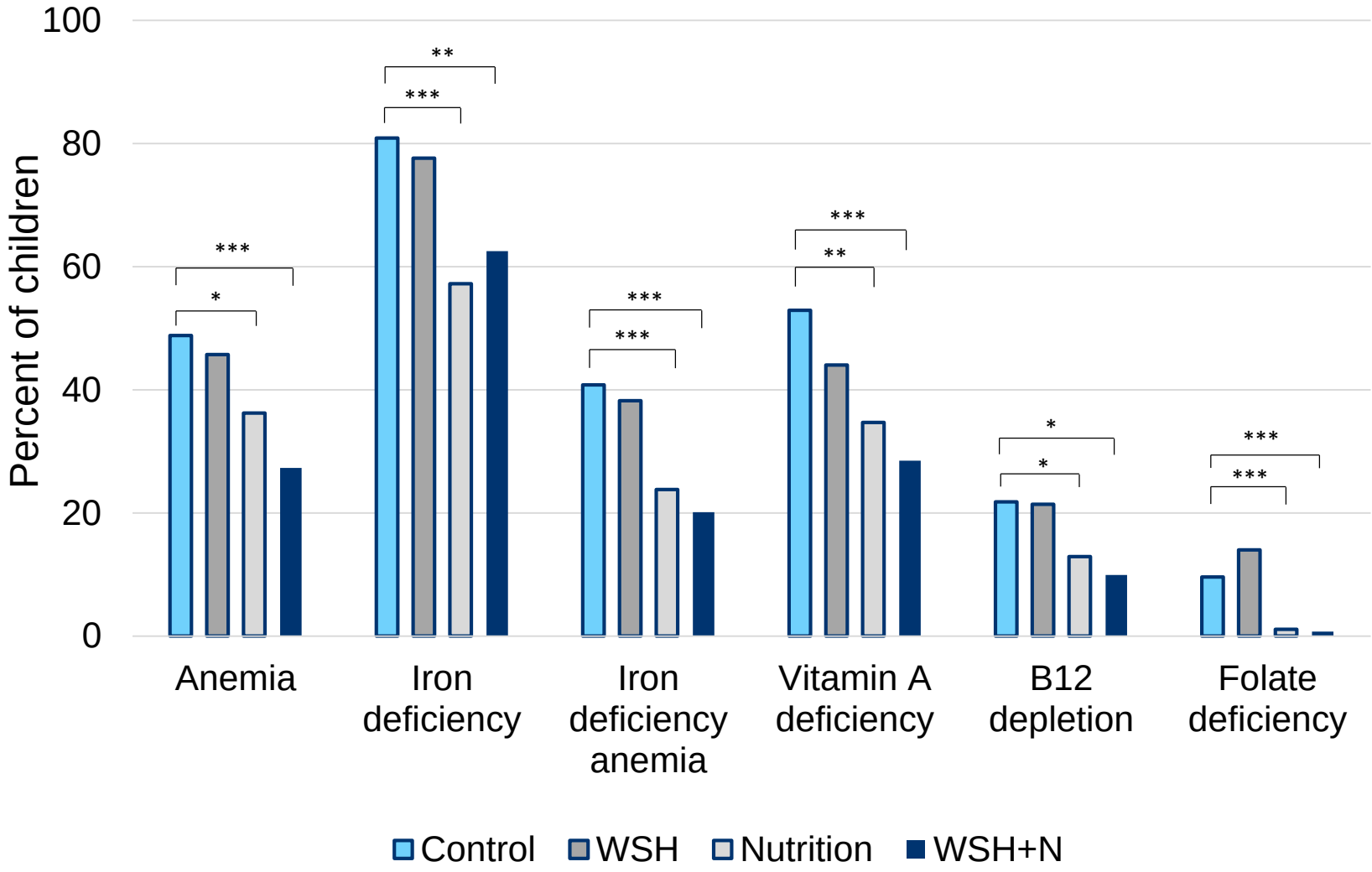


7-day diarrhea prevalence



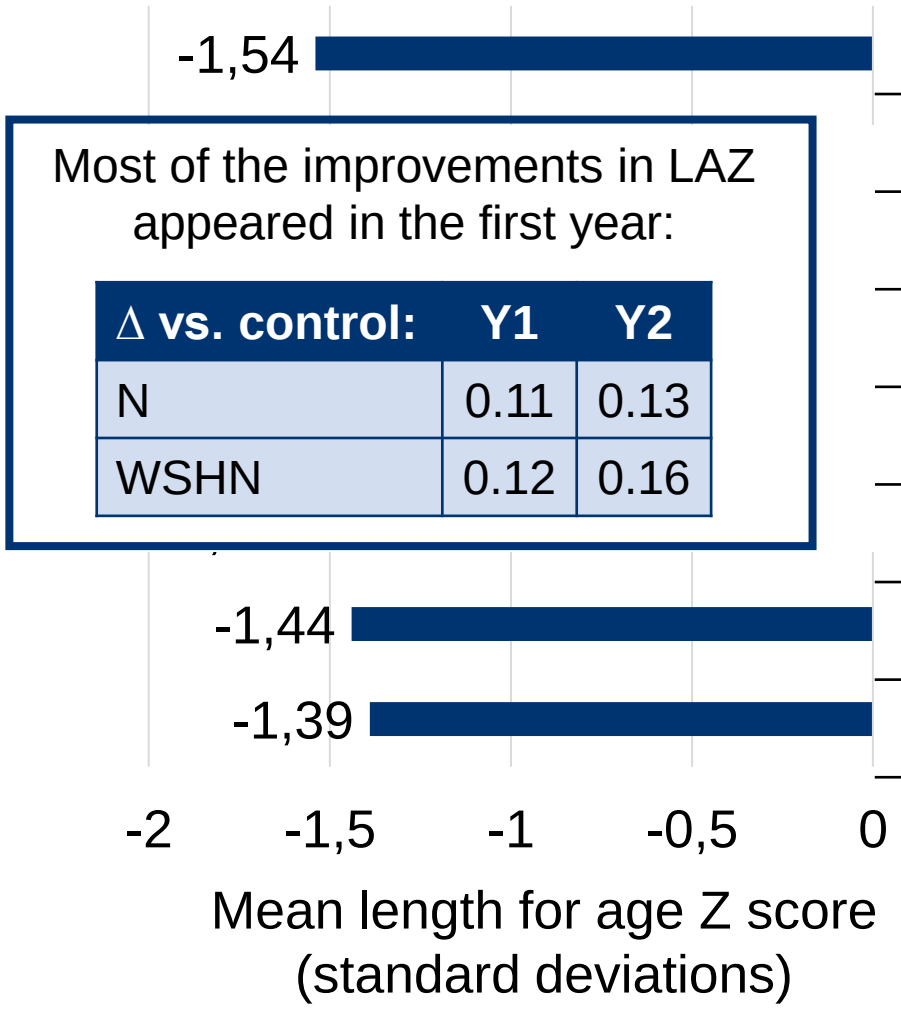
Micronutrient deficiencies

Christine Stewart, UC Davis



N = 120-200 children per arm (varies by outcome)

Length for age z-score



Most of the improvements in LAZ appeared in the first year:

Δ vs. control:	Y1	Y2
N	0.11	0.13
WSHN	0.12	0.16

	Stunting prevalence (%)
Active Control	31.5
Passive Control	31.1
Water	32.4
Sanitation	34.5
Handwashing	33.6
Combined WSH	32.8
Nutrition	28.9
Combined WSH+N	26.7

Child development

WHO motor milestones

- Parental report whether a child is able to do each of 6 behaviors

1. Sitting without support
2. Hands-and-knees crawling
3. Standing with assistance
4. Walking with assistance
5. Standing alone
6. Walking alone

Extended “Ages & Stages” questionnaire

- Age-specific (but overlapping) groups of questions
- Fieldworkers read each item to parent
- Record responses as
  - Yes
  - Sometimes
  - Not yet
- Some observational items

COMMUNICATION

Does your child say two or three words that represent different ideas together, such as “See dog,” “Mommy come home,” or “Kitty gone”?

GROSS MOTOR

Does your child jump with both feet leaving the floor at the same time?

PERSONAL-SOCIAL

Does your child copy the activities you do, such as wipe up a spill, sweep, shave, or comb hair?

Child development

Year 1 children 0.9-1.2 years old WHO motor milestones	Year 2 children 1.9-2.2 years old Extended Ages and Stages
1. **Standing with assistance** **WSHN 23% faster** than control – C.I. 1.09,1.40 2. **Walking with assistance** **WSHN 32% faster** than control – C.I. 1.7, 1.5 3. **Standing alone** **H 15% faster** than control – C.I. 1.01, 1.31 4. Walking alone **Age of attainment for each milestone was comparable to the WHO reference population.**	1. Communications z-score 2. Gross Motor z-score 3. Personal-social z-score 4. Combined z-score **No differences among arms**

Summary

- Adherence to the interventions was comparable to, or better than, what a government or large NGO might hope to achieve at scale
- Stored water quality improved and there were modest reductions in flies at the latrine and in visible dirt on hands
- **W, S, H, and WSH did not affect growth nor diarrhea**, even during the first year when adherence was higher
- **N and WSHN improved micronutrient status**; WSHN appears to have almost doubled the impact
- **N and WSHN had small growth benefits** (mainly during Y1), but there was no advantage to integrating the interventions
- H and WSHN might have improved motor milestone attainment after one year, but the interventions had **no effect on child development** after two years

Interpretation

These findings are specific to the **rural** setting in which:

1. water was plentiful but rarely available on-premises and subject to contamination at the source and in storage
2. unimproved latrine coverage was high and there was a culture of using sanitation facilities for defecation by humans but there was likely persistent exposure to animal feces in the household environment
3. handwashing was not a common practice
4. breastfeeding was common but exclusive breastfeeding was not, and most people had enough food but not a diverse diet
5. diarrhea prevalence was high throughout the year
6. many children had low LAZ but not WLZ

It is possible that higher adherence would have resulted in larger effects, but the results are relevant for other programs with similar adherence at scale.

Conclusions

1. **It's possible to integrate WSH and WSHN without compromising adherence, but there is almost no evidence of added benefit from either combination**
   - *Possibly* larger reduction in anemia from WSHN in Kenya
2. **These W, S, and H interventions did not reduce high levels of diarrhea** (but did reduce parasite infections)
   - Inconsistent with previous literature (un-blinded, with frequent behavior change and measurement)
3. **These W, S, and H interventions did not improve growth**
   - Community-level interventions starting from lower coverage might be able to (Mali CLTS - Pickering et al. 2015)
4. **Growth improvements from nutrition counseling + supplementation were very consistent but small**
   - Consistent with previous literature…back where we started

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Intestinal parasites

Amy Pickering, Tufts University

- Collected over 9000 stool samples at Y2
  - Index children and an older sibling
- Ascaris prevalence in control arm was 23%
  - 38% of index and 48% of older children dewormed in past 6 months
  - Prevalence was lower among those dewormed (16% versus 28%)
  - Prevalence was similar for index and older children (23% versus 22%)
- **W, WSH, and WSHN interventions reduced *Ascaris* prevalence to ~18%**
  - Susta ion
  - Imag
  - Sugg
- Very low %)
- No impact on *Giardia* infections (39% prevalence)

Weight and head circumference

- WAZ was also significantly higher in N (+0.11 s.d.) and WSHN (+0.14 s.d.) arms vs. control (mean of -0.72 s.d.)
- WLZ was close to WHO standard in control arm (mean 0.11 s.d.), but WSHN significantly higher (+0.09 s.d.)
- No differences in head circumference z-scores (control mean -0.27 s.d.)

- Only WSHN significantly reduced underweight (9.6% of control, 3 percentage points less in WSHN)
- Wasting (low WLZ) was rare (1.4% of control)

But no statistically significant differences between WSHN and N on any growth outcomes

Mortality (2 year follow-up)