Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial in Zimbabwe:

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SHINE
Finding ways to help children shine!

Collaborating Institutions and Investigators

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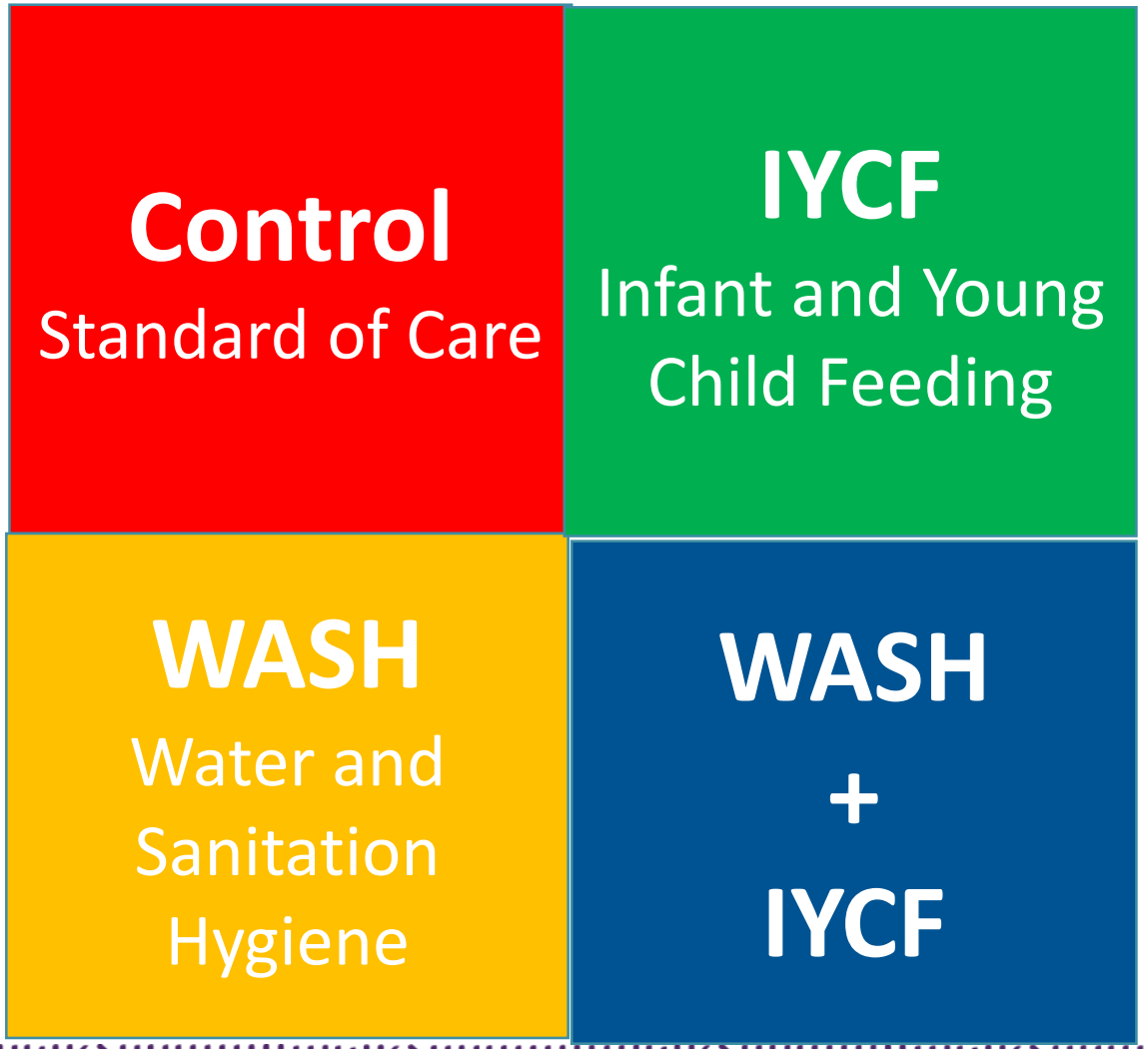
Johns Hopkins Bloomberg School of Public Health Jean Humphrey, Lawrence Moulton, Margaret Kosek
Queen Mary University of London Andrew Prendergast
Cornell University Rebecca Stoltzfus
University of Liverpool Melissa Gladstone
University of British Columbia Amee Manges
George Washington University James Tielsch
Middlebury College John Maluccio
University of Michigan Andrew Jones

Hypothesis

- Household WASH interventions will improve child linear growth and child haemoglobin concentration
- Effects will be even greater if WASH and infant feeding combined

2 x 2 factorial design: **independent** and **combined** effects



Study population:

Women in Chirumanzi and Shurugwi districts who became pregnant between November 2012 - March 2015

400 Village Health Workers (VHWs)
employed by
Zimbabwe Ministry of Health and Child Care (MoHCC)

- Conducted prospective pregnancy surveillance
- Referred to SHINE
- 5280 women recruited
- Median (IQR) age at enrolment:
  12.5 (9,16) wk gestation

Interventions

400 VHWs

Delivered treatment-arm-specific behavior-change interventions at 15 infant age-specific visits

Outcome assessment

43 Research nurses:

Assessed outcomes at:
14, 32 wk gest & 1, 3, 6, 12, 18 mo

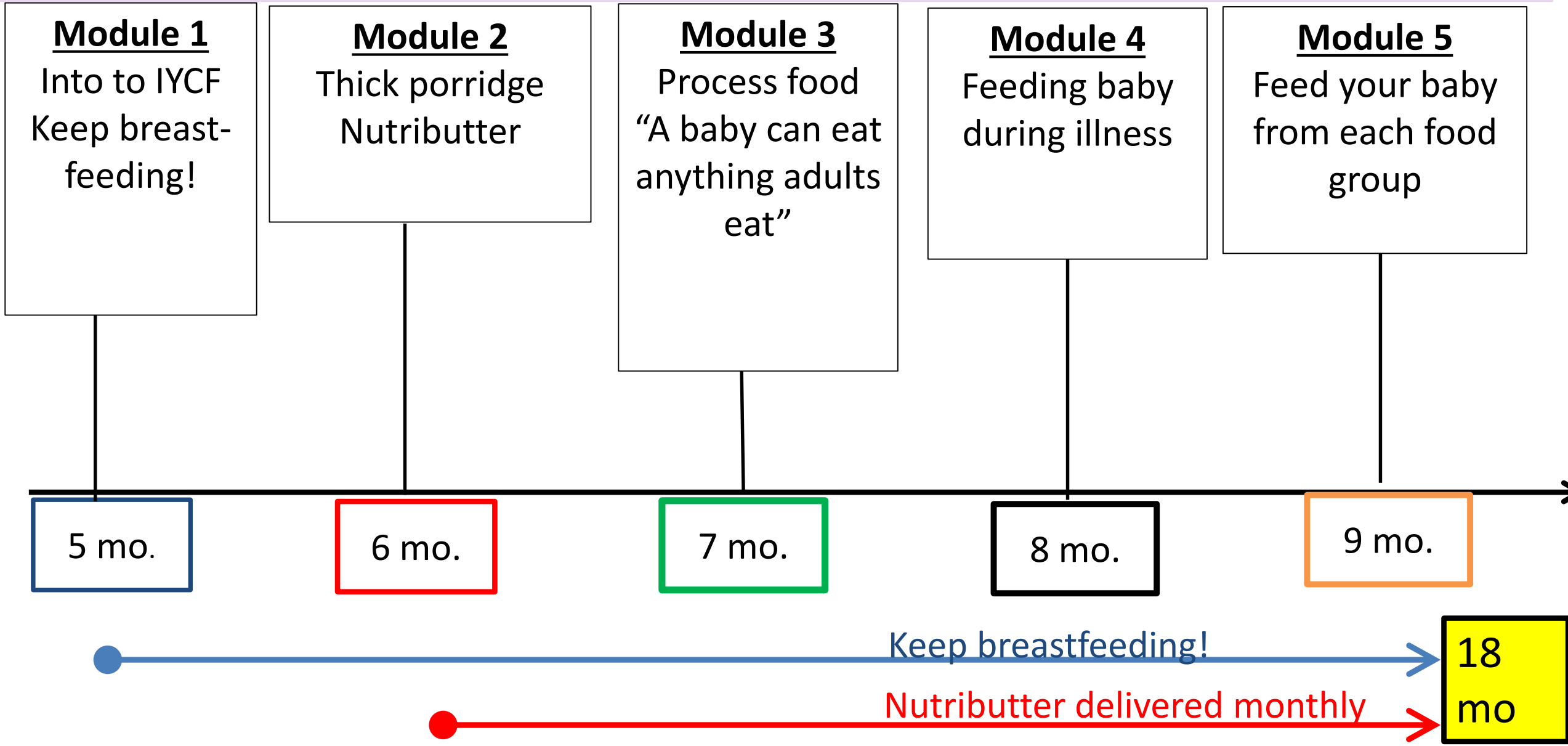
Assessed intervention uptake at 12 mo

Interventions

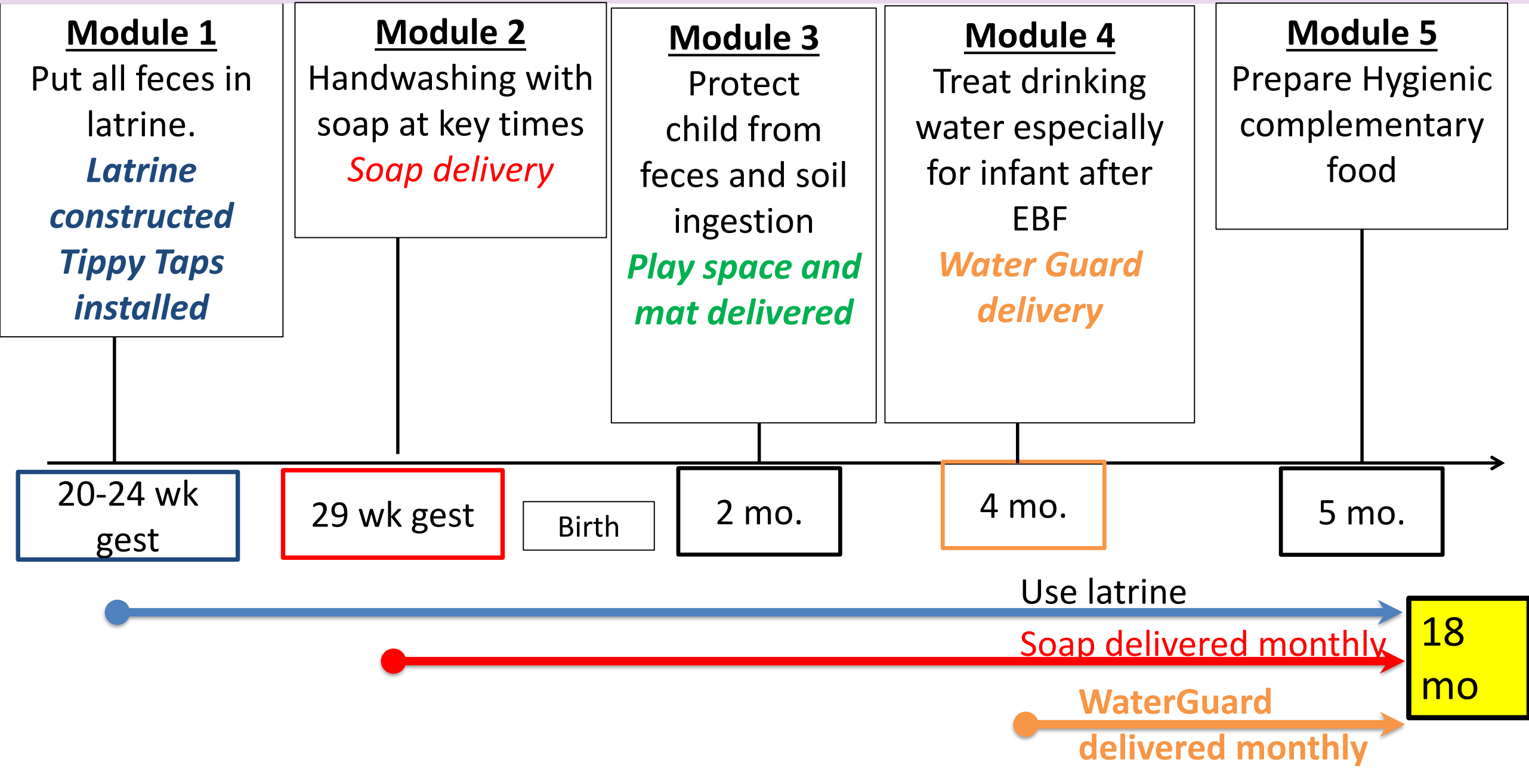
All children received the Standard of Care (Control) interventions

- Exclusive breastfeeding intervention
- Promoted uptake:
  - ANC
  - PMTCT
  - Immunization
  - Family Planning

The IYCF Intervention



The WASH Intervention



Centralized brick and slab moulding

Community builders

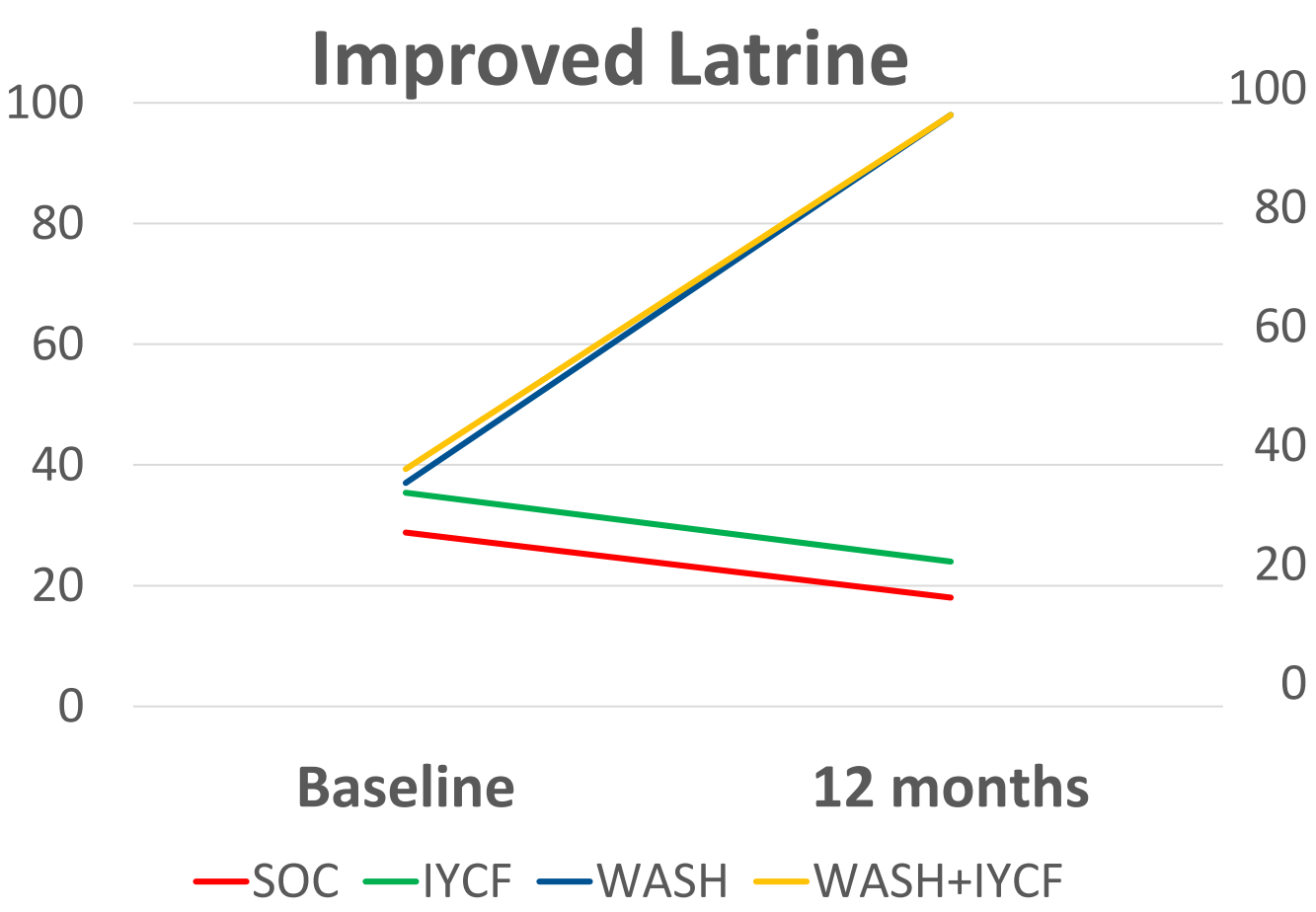
MoHCC supervised

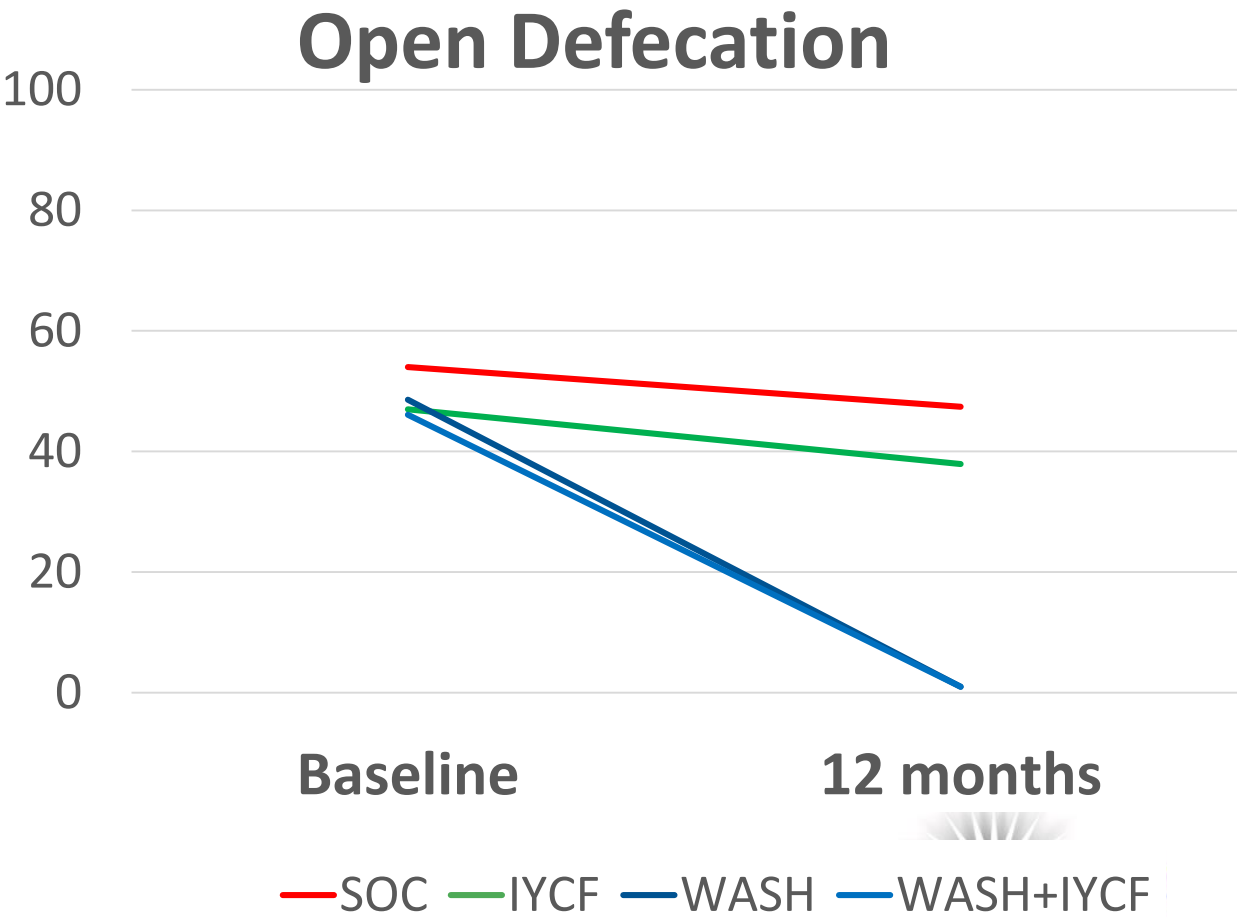
2500 WASH latrines at enrolment

2500 Non-Wash latrines after trial

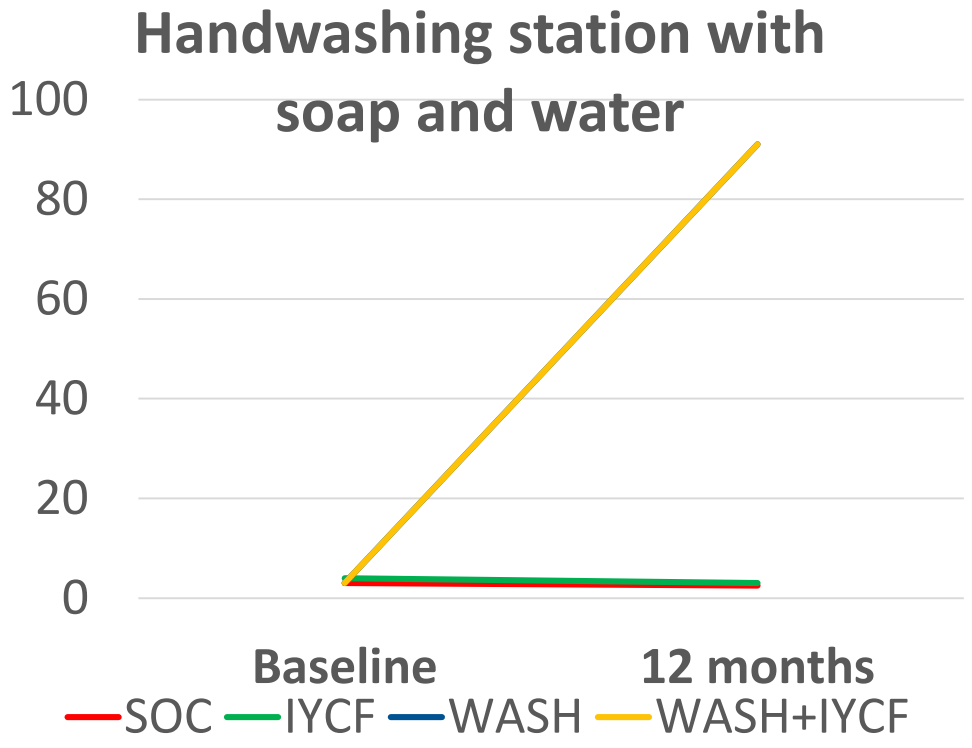
Fidelity of Intervention Delivery

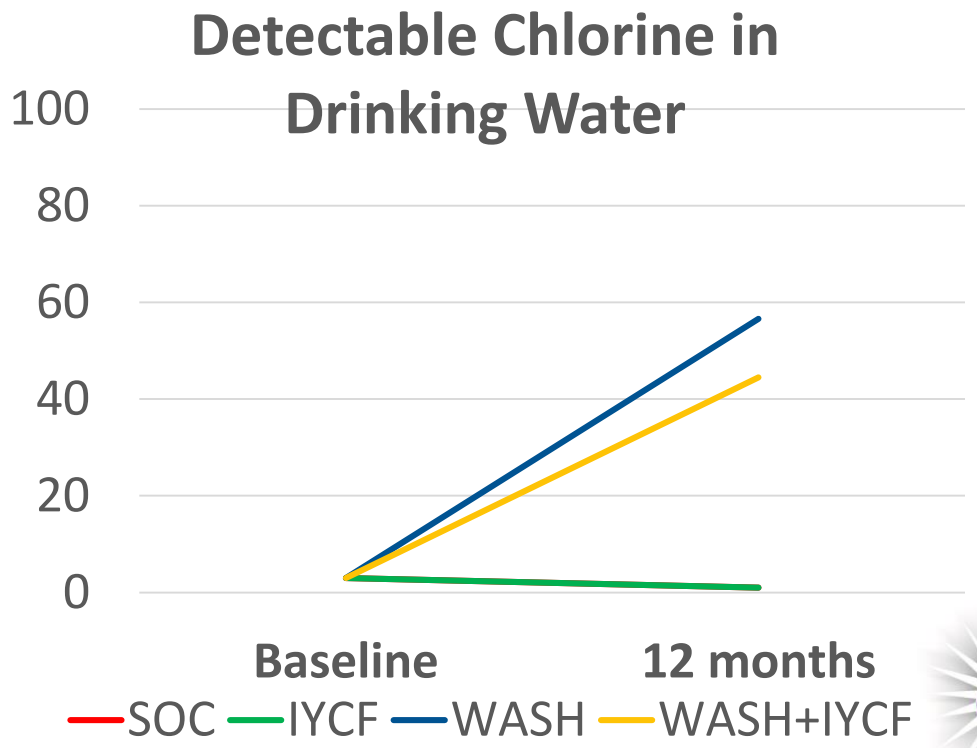
Presence of improved latrine and Open Defecation by Household members at baseline and 12 months



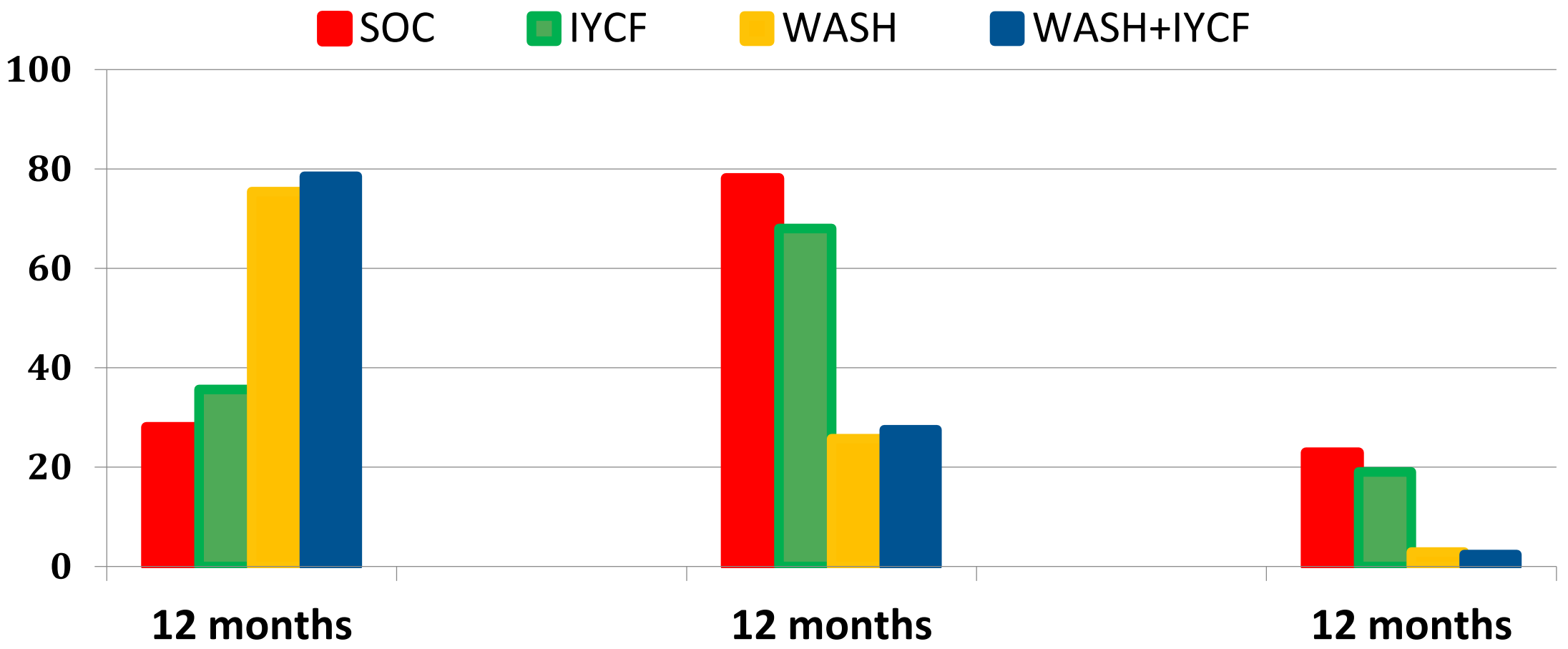


Presence of handwashing station with soap and water AND having detectable chlorine in drinking water at baseline and 12 months





WASH uptake: Infant faeces disposal and geophagia

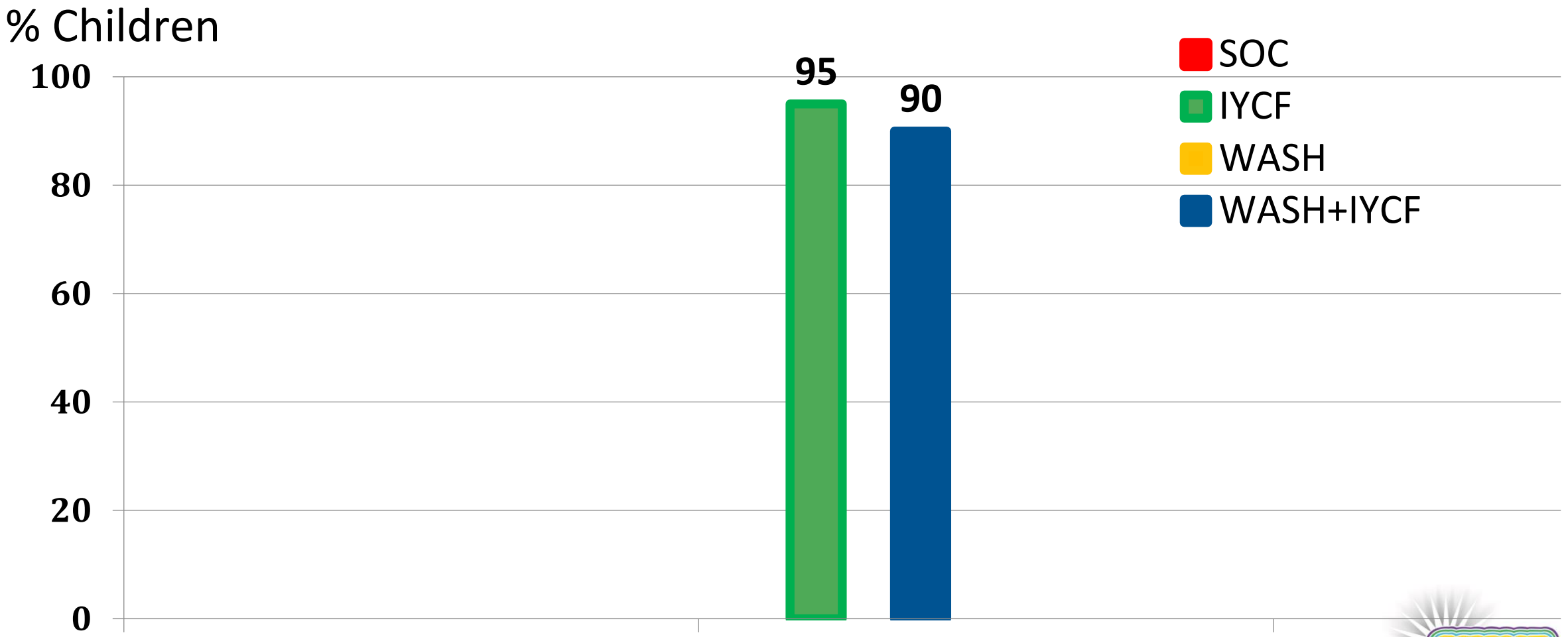


Disposes nappy water in latrine

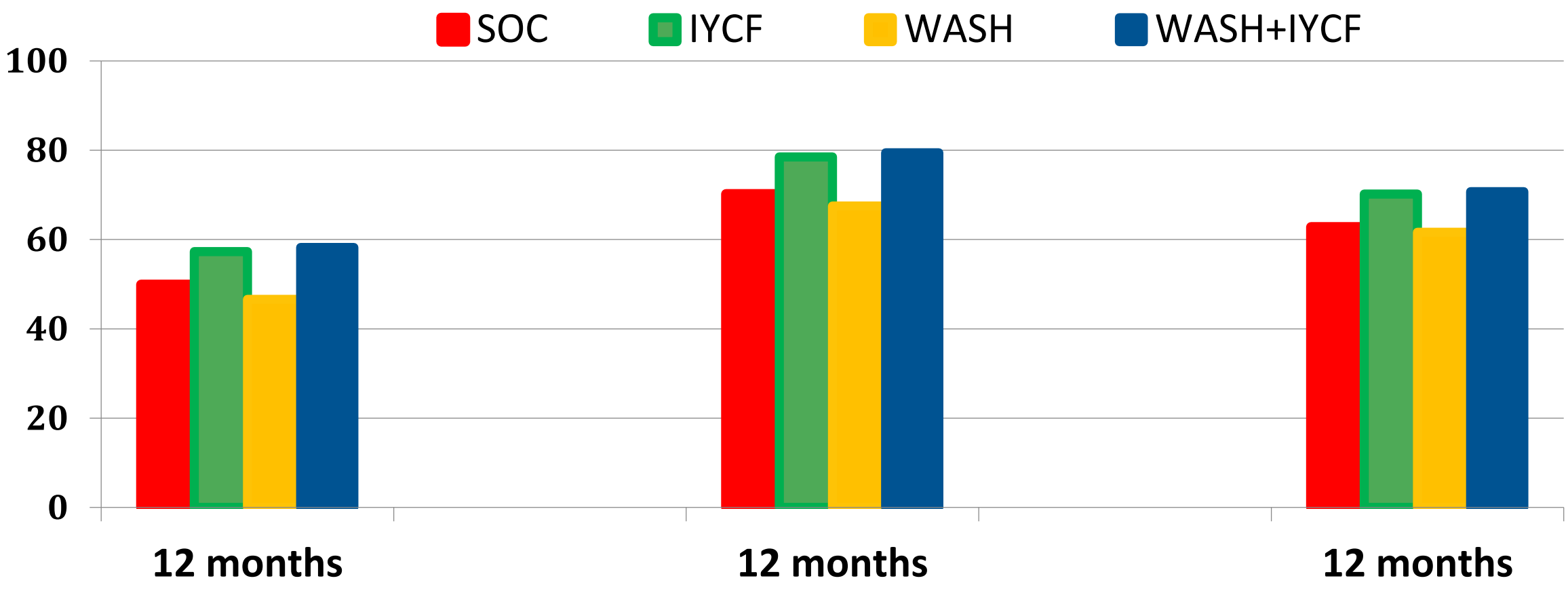
Child ever observed to eat soil

Child ever observed to eat chicken feces

IYCF uptake: Consumed Nutributter past 24 hours



IYCF uptake: Child diet quality (without Nutributter)



Iron-rich food consumed

Vitamin A-rich food consumed

Animal-source food consumed

SHINE outcomes

Outcomes assessed at 18 months infant age

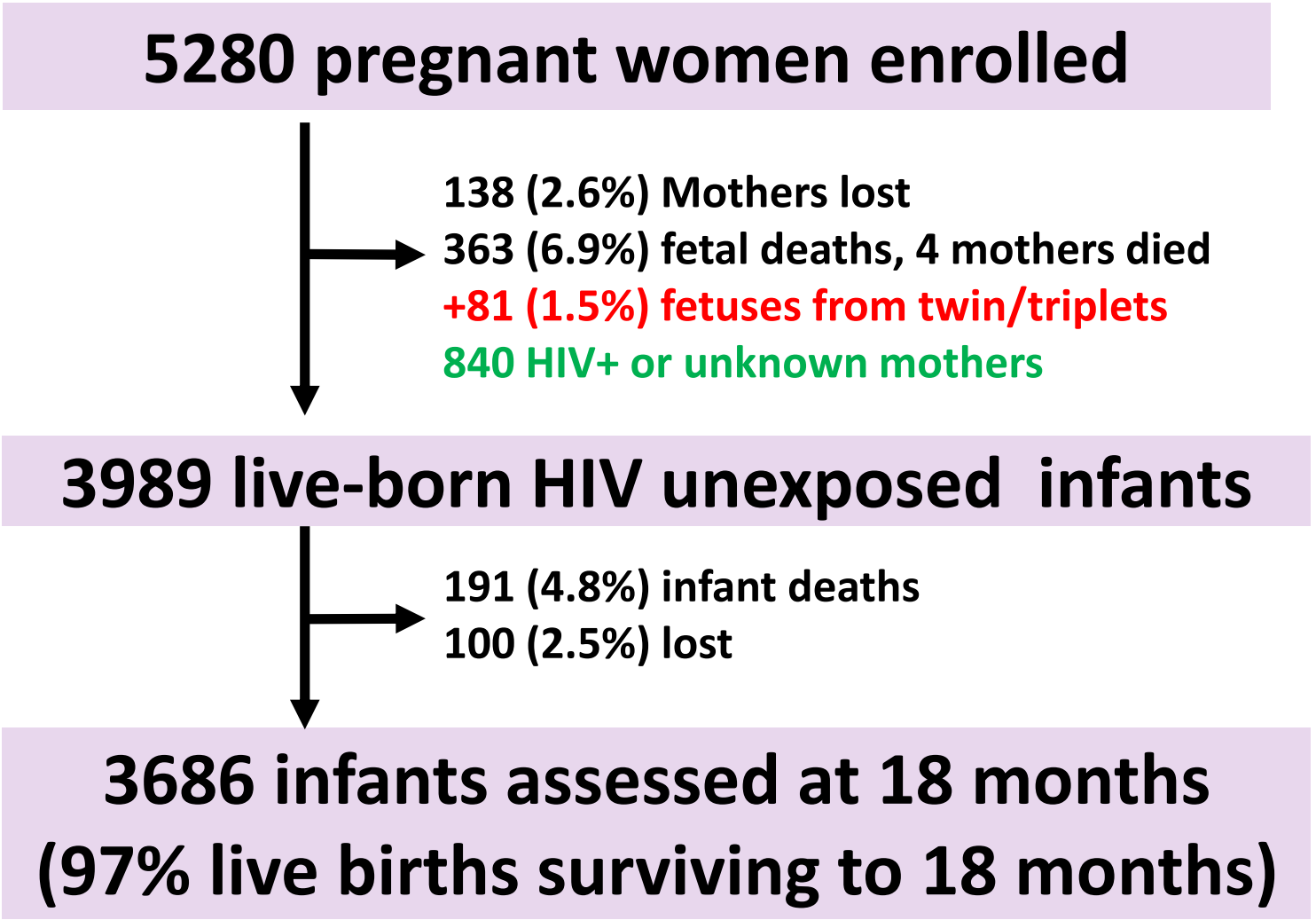
Primary

- LAZ
- Hemoglobin

Secondary

- Stunted
- Anemic
- Diarrhea at 12 and 18 months

Primary inferences from HIV-unexposed infants
(results from HIV-exposed infants will be reported separately)


5280 pregnant women enrolled
138 (2.6%) Mothers lost
363 (6.9%) fetal deaths, 4 mothers died
+81 (1.5%) fetuses from twin/triplets
840 HIV+ or unknown mothers
3989 live-born HIV unexposed infants
191 (4.8%) infant deaths
100 (2.5%) lost
3686 infants assessed at 18 months
(97% live births surviving to 18 months)

Baseline Characteristics	Control	IYCF	WASH	WASH+IYCF
Any latrine, %	33	41	42	44
Open defecation, % HH members	54	47	49	46
Primary water source is unimproved, %	38	35	39	36
One way walk time >15 minutes, %	30	25	30	29
Volume collected mean (SD) L/PC/d	9.4 (10.1)	9.6 (8.4)	9.8 (16.3)	9.5 (9.9)
Handwashing station, %	5	3	15	15
Electricity, %	3	4	3	2
Wealth index, centered at 0, mean (SD)	-0.06(1.88)	0.27(1.76)	0.03(1.80)	0.12(1.76)
Coping Strategies Index, Median (IQR)	1 (0,7)	0 (0,6)	1 (0,7)	1 (0,7)
Maternal schooling, y, mean (SD)	9.6 (2.2)	9.7 (2.8)	9.5 (2.0)	9.6 (2.5)
Infant birth weight, Kg mean (SD)	3.1 (0.6)	3.1 (0.5)	3.1 (0.5)	3.1 (0.5)
Institutional delivery, % infants	88	88	89	90

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Impact of Infant and Young Child Feeding (IYCF) Intervention

Effect of IYCF on LAZ at 18 months of age

	N	Mean (SD)	Difference due to IYCF	
			Unadjusted (95%CI)	Adjusted (95%CI)
No IYCF	1792	**-1.59** (1.08)	**+0.16** (0.08, 0.23) p<0.001	**+0.13** (0.06, 0.20) p<0.001
IYCF	1879	**-1.44** (1.06)		

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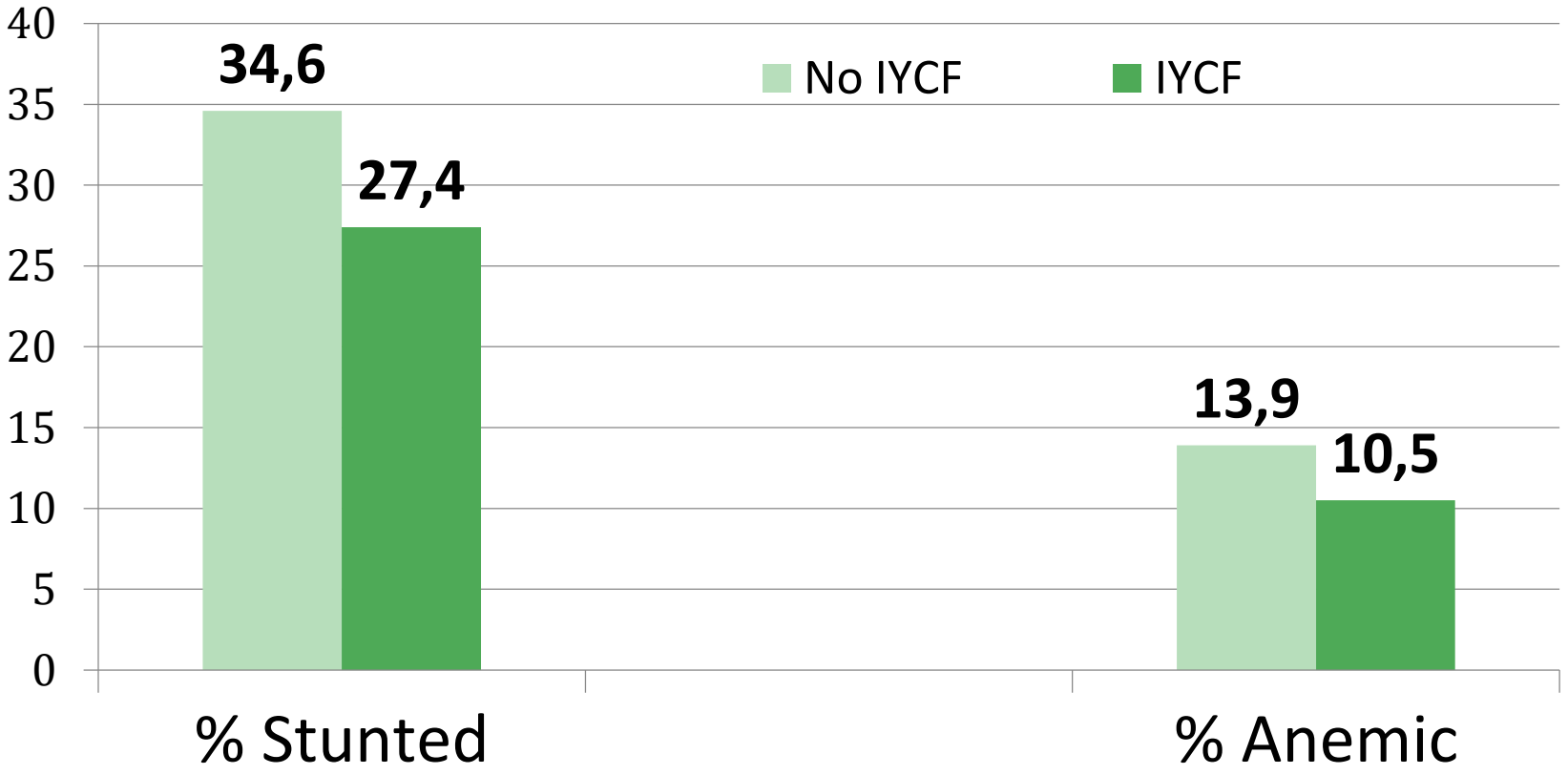
Effect of IYCF on Hemoglobin (g/dL) at 18 mth of age

	N	Mean (SD)	Difference due to IYCF	
			Unadjusted (95%CI)	Adjusted (95%CI)
No IYCF	1759	**11.63** (1.18)	**+0.20** (0.13, 0.28) p<0.001	**+0.19** (0.12, 0.27) P<0.001
IYCF	1845	**11.83** (1.15)		

Effect of IYCF on Stunting and Anemia



	% Stunted	% Anemic
	RR (95%CI)	RR (95%CI)
Unadjusted	**0.79** (0.72, 0.87)	**0.75** (0.62, 0.90)
Adjusted	**0.81** (0.74, 0.88)	**0.76** (0.63, 0.92)

Impact of WASH intervention

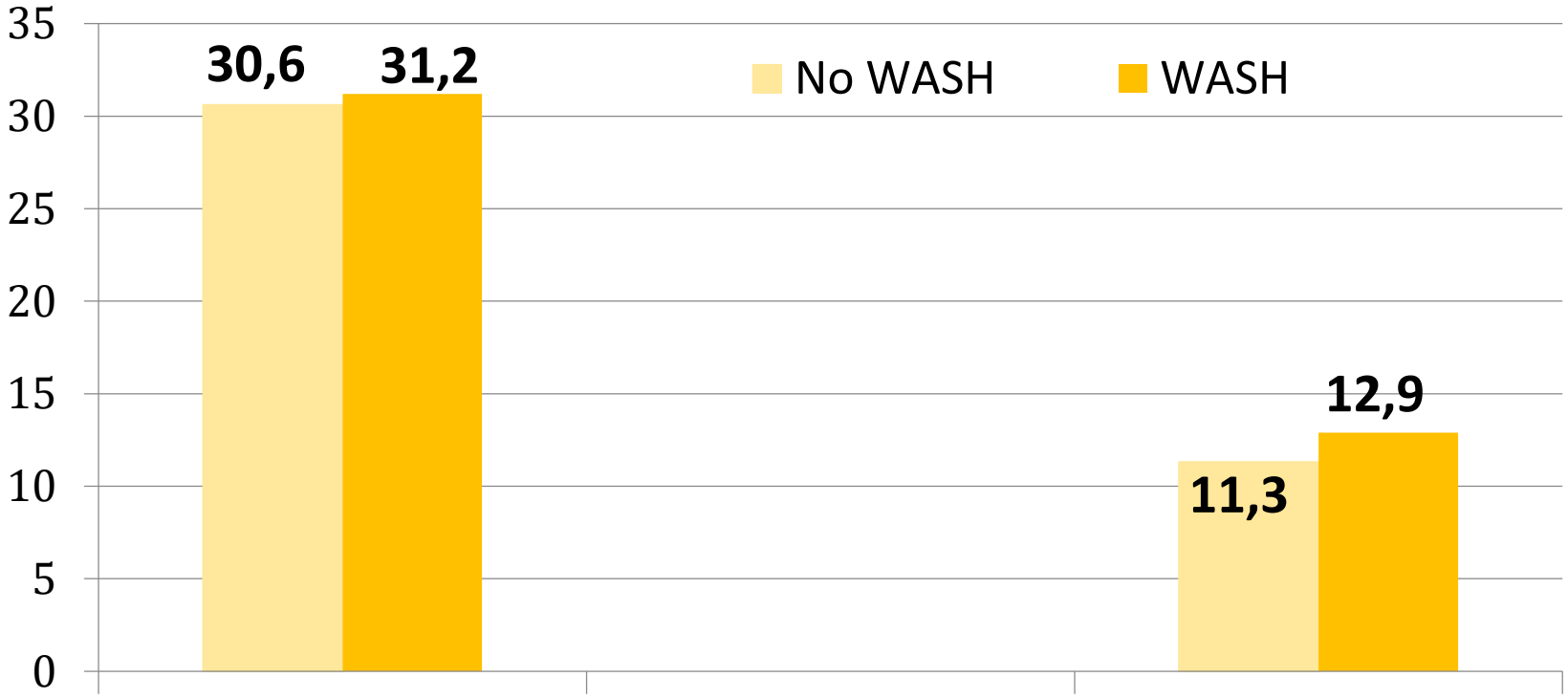
Effect of WASH on LAZ at 18 months of age

	N	Mean (SD)	Difference due to WASH	
			Unadjusted (95%CI)	Adjusted (95%CI)
No WASH	1769	**-1.52** (1.07)	**+0.02** (-0.06, 0.09) p=0.70	**+0.05** (-0.02, 0.12) p=0.13
WASH	1902	**-1.50** (1.07)		

Effect of WASH on Hemoglobin (g/dL) at 18 months of age

	N	Mean (SD)	Difference due to WASH	
			Unadjusted (95%CI)	Adjusted (95%CI)
No WASH	1748	**11.75** (1.13)	**-0.03** (-0.10, 0.05) p=0.47	**-0.06** (-0.14, 0.02) p=0.13
WASH	1856	**11.72** (1.21)		

Effect of WASH on Stunting and Anemia



	RR (95%CI)
Unadjusted	**1.03** (0.93, 1.13)
Adjusted	**1.00** (0.91, 1.10)

	RR (95%CI)
Unadjusted	**1.14** (0.95, 1.36)
Adjusted	**1.13** (0.92, 1.37)

Diarrhea

7 day diarrhea prevalence at 18 months

Main Effects	Prevalence (%)	Difference (95%CI)	p	Adjusted (95%CI)	p
NO IYCF	9.9	1.0 (Ref)		1.0 (Ref)	
IYCF	9.4	**0.94** (0.77,1.16)	0.82	**0.97** (0.80, 1.20)	0.82
NO WASH	8.4	Ref		Ref	
WASH	10.7	**1.28** (1.04,1.57)	0.02	**1.15** (0.93, 1.41)	0.19

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Summary

- SHINE was an efficacy trial: interventions were delivered with high fidelity and substantial behaviour change was achieved.
- The IYCF intervention led to significant but modest improvements in stunting and anaemia; this is consistent with decades of studies on complementary feeding. The IYCF intervention had no effect on diarrhoea.
- The WASH intervention had no benefit on stunting, anaemia, or diarrhoea.

Summary of WASH Benefits (Kenya and Bangladesh) and SHINE (Zimbabwe)

		Bangladesh	Kenya	Zimbabwe
Stunting	IYCF	YES	YES	YES
	WASH	NO	NO	NO
Anemia	IYCF	YES	YES	YES
	WASH	NO	NO	NO
Diarrhea	IYCF	YES	NO	NO
	WASH	YES	NO	NO

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Donors

- Bill and Melinda Gates Foundation
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- Wellcome Trust

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