



The Impact of SQ-LNS on Child Growth in the ZamCharts RCT in Zambia

Doug Parkerson (IPA)

Günther Fink (Swiss TPH), Peter Rocker (BU), Dorothy Sikazwe (MoH Zambia),
Lindsey Locks (BU), Jacqueline Lauer (BU), Chiza Kumwenda (U of Zambia)



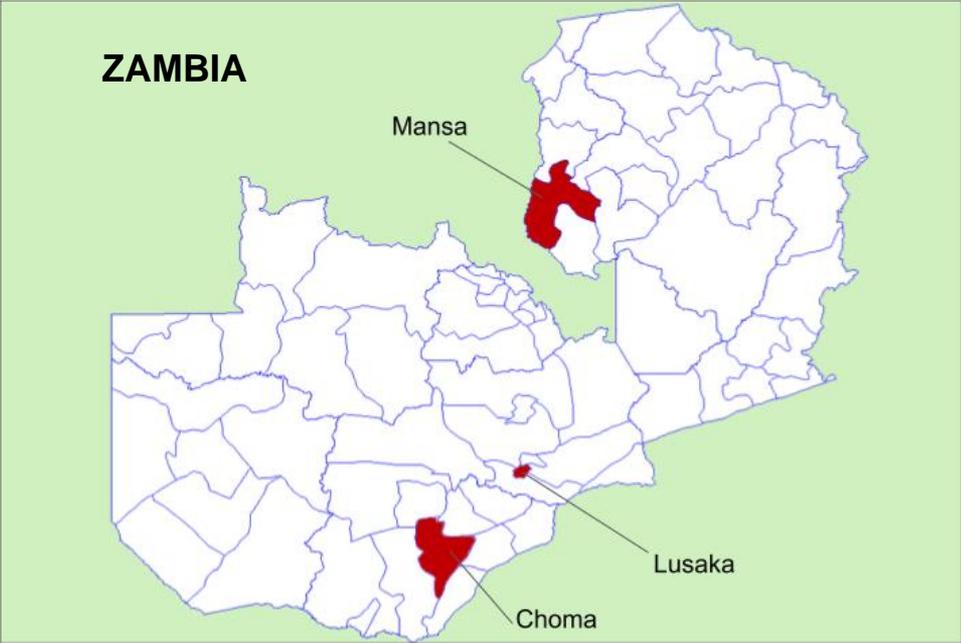
Project Mgmt & Data Collection: Tamara Billima-Mulenga, Mpela Chembe,
Stephanie Adjovu, Mwiinga Cheelo, Savanna Henderson

Outline

- Motivation
- Study Design
- Results
- Next Steps

- Stunting remains a major problem in Zambia: according to the 2018 DHS, **35% of children were stunted nationwide**, with much higher rates in some regions
- Home-based growth monitoring (Growth Charts) was shown to reduce stunting in a trial in eastern Zambia (Fink, 2017).
- Opportunity to test **Growth Charts** at a larger scale in a diverse set of districts and to compare to **SQ-LNS**.
- Opportunity to explore questions related to consumption compliance, willingness to pay, child development, gut microbiome and EED, and IYCF programming.
- Interest from the Ministry of Health

ZamCharts RCT in Three Districts in Zambia



ZamCharts RCT
(Caregiver-child dyads)

Control 70 clusters 557 dyads	Growth Charts 70 clusters 643 dyads
SQ-LNS only 71 clusters 525 dyads	SQ-LNS & Growth Charts 71 clusters 566 dyads

Study Design

The study is designed as a multi-factorial randomized controlled trial.



A **cluster-randomized controlled trial** across 3 diverse districts: Choma, Lusaka and Mansa.



Each study cluster corresponds to a census **enumeration area (EA)**.



Approximately **95 EAs/clusters** were **randomly selected** from the complete list of EAs in each district.



All households were visited in each cluster, and families with a child that would be between 6 and 11 months at the launch of the intervention were enrolled into the study.

Study Objectives

The study had three main aims.



Specific Aim 1:

Rigorously assess the impact of growth charts installed in children's homes on children's physical growth through a 3-district trial



Specific Aim 2:

Assess the extent to which growth trajectories can be modified through the provision of SQ-LNS



Specific Aim 3:

Assess the extent to which growth trajectories can be modified through the joint provision of SQ-LNS and home-installed growth charts

Secondary Objectives



Secondary Aim 1:

Observe feeding practices within the household, including SQ-LNS



Secondary Aim 2:

Assess the willingness to pay for SQ-LNS among participating households.



Secondary Aim 3:

Assess the gut microbiome and prevalence of environmental enteric dysfunction (EED)

Timeline



Intervention Materials I: Growth Charts

- Nutritional advice and Aspirational space
- Recipes
- Measurement space
- Game space

HEALTHY AND THRIVING CHILDREN

1 Continue breastfeeding your child until 24 months of age
2 Giving your child a variety of foods daily will make them grow healthy.
3 It is important to feed your child 3-4 times a day
4 Wash hands with soap before cooking or feeding your child

1 I would like my child to grow up to be a...

0 - 8 months	9 - 11 months	12 - 24+ months
Continuing Breastfeeding • Breastfeed on demand • Offer breast milk as often as your child wants • If you are not breastfeeding, you should offer your child a breast milk substitute • If you are not breastfeeding, you should offer your child a breast milk substitute • If you are not breastfeeding, you should offer your child a breast milk substitute	Continuing Breastfeeding • Continue to breastfeed on demand • Offer breast milk as often as your child wants • If you are not breastfeeding, you should offer your child a breast milk substitute • If you are not breastfeeding, you should offer your child a breast milk substitute • If you are not breastfeeding, you should offer your child a breast milk substitute	Continuing Breastfeeding • Continue to breastfeed on demand • Offer breast milk as often as your child wants • If you are not breastfeeding, you should offer your child a breast milk substitute • If you are not breastfeeding, you should offer your child a breast milk substitute • If you are not breastfeeding, you should offer your child a breast milk substitute

1 year 1.5 years 2 years 2.5 years 3 years

Height (cm): 110, 105, 100, 95, 90, 85, 80, 75, 70, 65, 60

Children who do not get the food they need in early life will not reach their full potential

COUNT AND SEARCH GAME

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10

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Intervention Materials II: LNS



SQ-LNS

Small Quantity - Lipid-based Nutrient Supplement (SQ-LNS or LNS-SQ)



20 grams

20 g individual sachet



Child growth

Promotes healthy child growth, motor and cognitive development



Prevents stunting

Prevents stunting, wasting, anemia and iron deficiency



Young children

For children from 6 to 24 months



1 sachet daily

1 sachet per day per child



- Nutributter is made from peanuts and contains important nutrients to support healthy growth and development.
- **Nutributter is not a replacement for breastmilk or other foods/meals.**
- Nutributter provides nutrients the [index child] needs for healthy growth, but you must **continue to breastfeed your child and provide a diverse diet with meat, fish, eggs, fruits and vegetables.**
- Once a day you should mix a sachet of Nutributter in with your child's meal or it can be eaten directly from the sachet.
- **Feed your child one sachet a day.**
- Nutributter should be consumed within 2 hours of mixing with the child's complementary food. After opening, the sachet should be consumed within 24 hours.
- Nutributter is meant only for the [NAME of index child] and should not be given to other children in the household or other members of the family.

Recap



Census & Baseline

Baseline surveys showed high prevalence of stunting among 2,300 children



Intervention Launch

Intervention launched in November 2021 using two delivery methods of supplements



Intervention

Growth charts installed and caregivers trained to monitor child height monthly.

SQ-LNS distributed to households for 18 months



Sub-studies

Biomarkers, LNS Observation and Mental Health sub-studies conducted

Enrolment by District

	Choma		Lusaka		Mansa		Total
	Count	Percent	Count	Percent	Count	Percent	Count
Total Households visited	10,605	27.3	16,451	42.4	11,774	30.3	38,830
Total eligible children	692	30.2	790	34.5	809	35.3	2,291
Control	187	27.0	201	25.4	169	20.9	557
Posters only	195	28.2	221	28.0	227	28.1	643
Supplements only	159	23.0	158	20.0	208	25.7	525
Posters and supplements	151	21.8	210	26.6	205	25.3	566

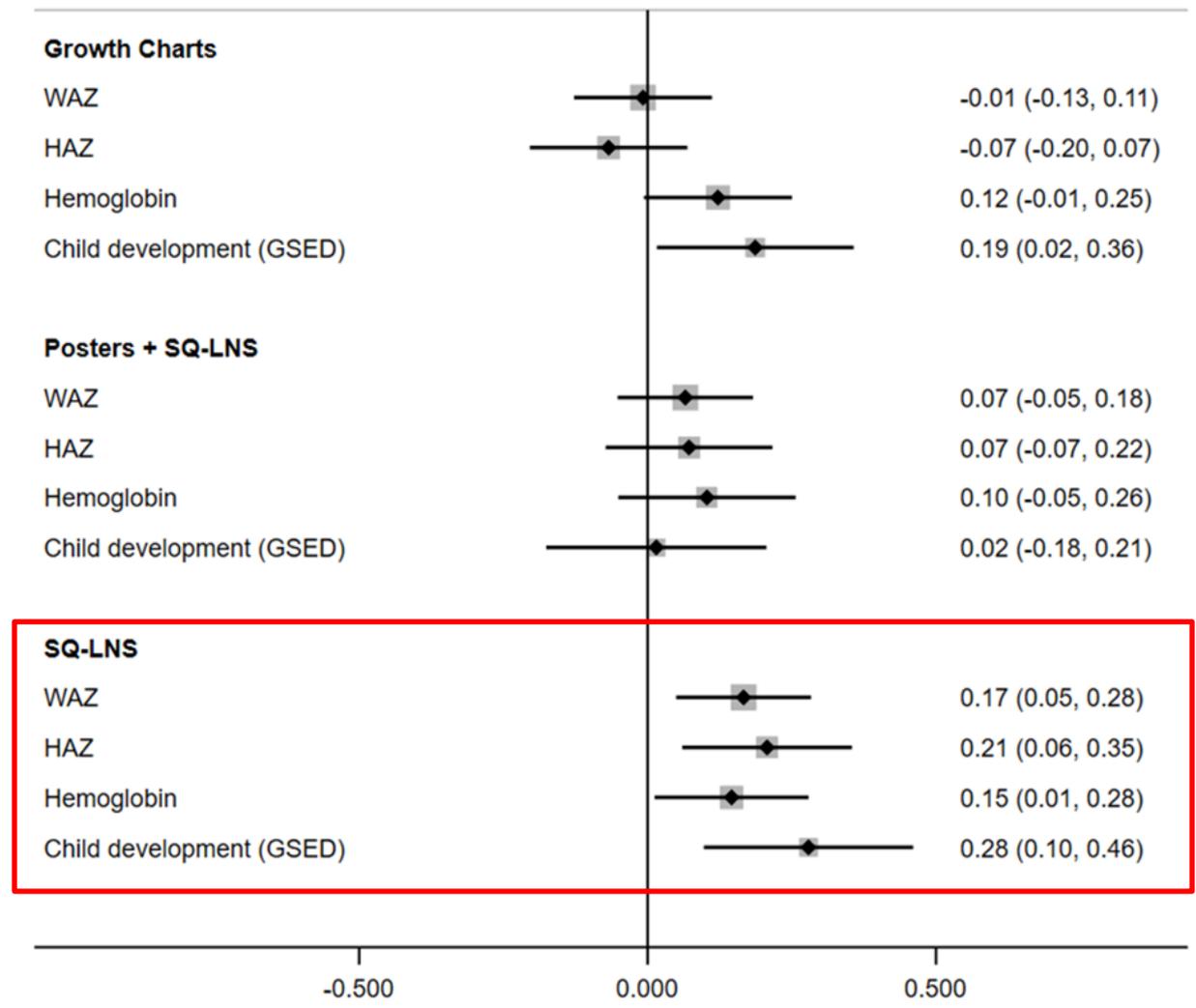
Household and Child Characteristics

		Control	
Child is female	N (%)	240	51%
Child age at enrollment (months)	Mean, SD	5.5	2.1
Child is a twin	N (%)	21	4%
Caregiver age (years)	N (%)	27.2	7.3
Caregiver: no or primary schooling	N (%)	184	39%
Caregiver: secondary schooling	N (%)	227	48%
Caregiver: higher education	N (%)	62	13%
Caregiver married	N (%)	350	74%
Household members	Mean, SD	6.6	2.8
Asset quintile	Mean, SD	3.0	1.4
HAZ at baseline	Mean, SD	-0.94	1.39
HAZ at endline	Mean, SD	-2.01	1.18
Stunted at baseline	N (%)	102	22%
Stunted at endline	N (%)	231	50%

Note: at endline, 1950 mother-child pairs (85%) were successfully assessed (n=473, 543, 448, 486 in arms 1, 2, 3 and 4, respectively).

Results

Treatment Effect Summary



Impact on primary outcomes (stunting)

Intervention and Odds of stunting

Odds ratio (95% CI)

Growth Charts

Unadjusted Stunted (HAZ < -2)

1.30 (0.94, 1.79)

Adjusted Stunted (HAZ < -2)

1.28 (0.92, 1.79)

Posters + SQ-LNS

Unadjusted Stunted (HAZ < -2)

0.87 (0.63, 1.21)

Adjusted Stunted (HAZ < -2)

0.84 (0.60, 1.16)

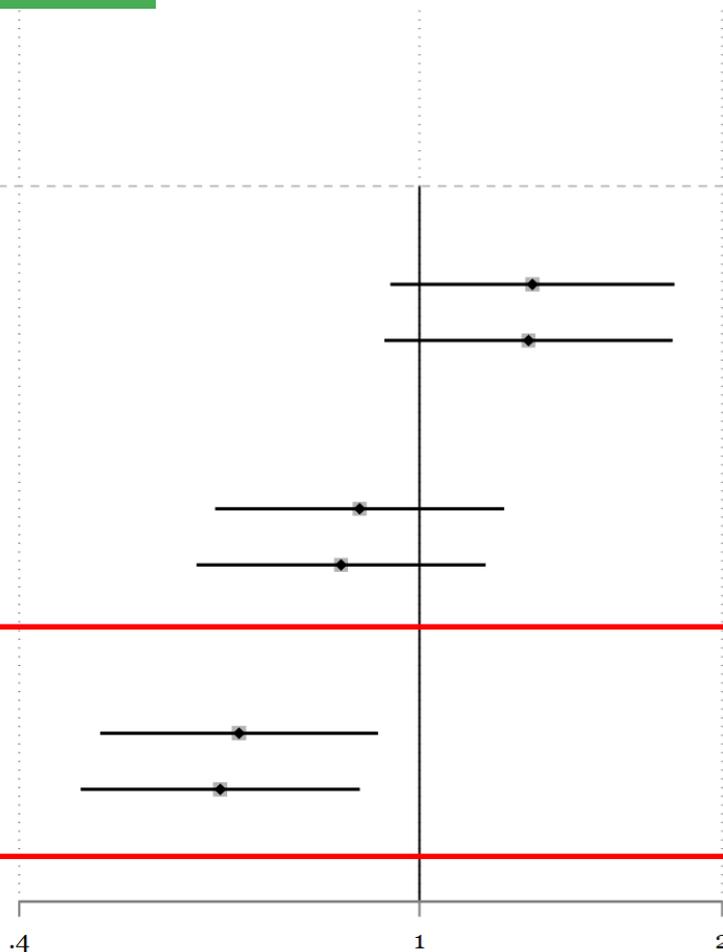
SQ-LNS

Unadjusted Stunted (HAZ < -2)

0.66 (0.48, 0.91)

Adjusted Stunted (HAZ < -2)

0.63 (0.46, 0.87)



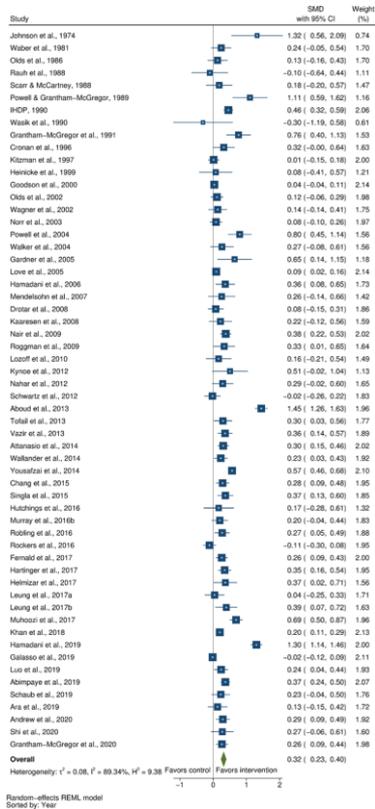
- Growth charts slightly reduced average HAZ and increased stunting rates, but not statistically significant.
- LNS improved HAZ and reduced odds of stunting by 37%.
- The combined intervention did not have an impact on the primary outcomes.

Graph on the left-side of the 1 indicating better outcomes.

Child Development

- Our analysis suggests a 0.19 SD increase in child development for growth charts, and a 0.28 SD increase in child development for SQ-LNS
- How large are these effects compared to other interventions?
- In the field of child development, home visiting programs are currently the the gold standard

Child Development

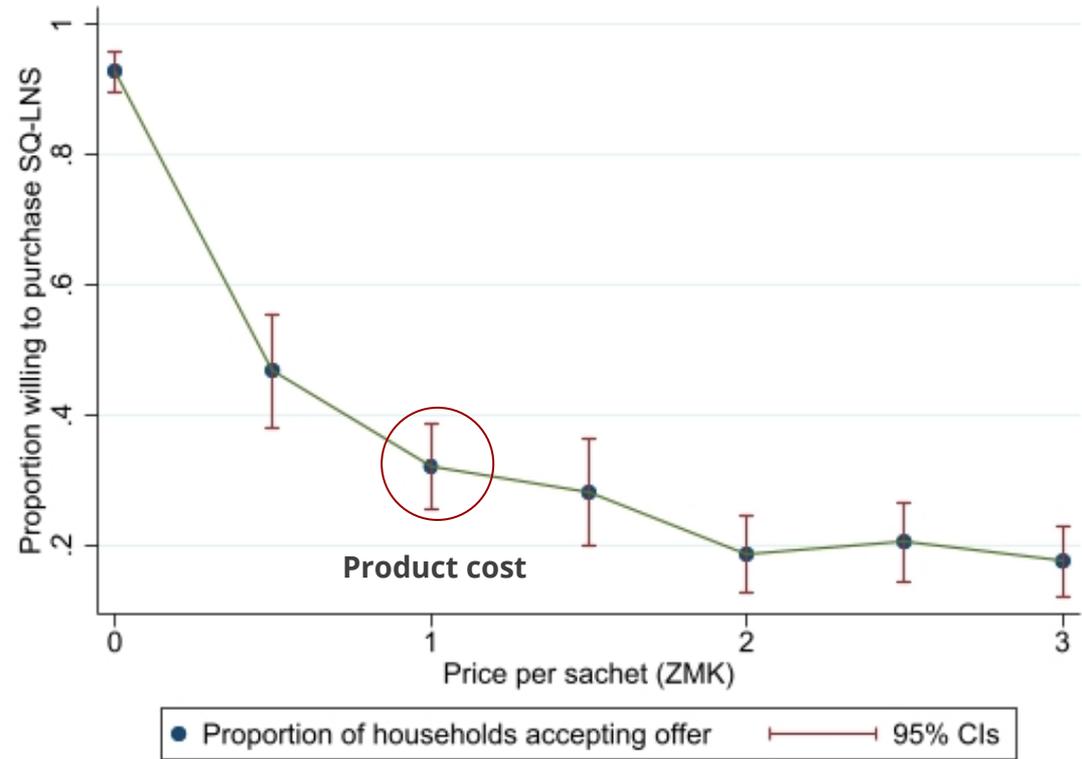


- A systematic review conducted in 2021 (Jeong et al PLOS Med) identified 102 (!) unique RCTs evaluating parenting interventions
- The authors find average improvements of 0.32 SD (95% CI 0.23, 0.40] for cognition and 0.28 SD [0.18 to 0.37] for language
- These effect sizes seem very similar to what we saw in our trial but typically require visiting each family twice a month for one hour, and are thus likely much more expensive than SQ-LNS or growth charts distributions

Willingness-to-Pay

- As part of the endline survey, we also asked caregivers if they were willing to purchase SQ-LNS
- To understand how much families are on average willing to pay, we made offers at various price points (randomized) for a single sachet:
 - High (full cost): ZMW 3
 - Medium: ZMW 2
 - Medium-Low: ZMW 1.5
 - Low point (sachet cost): ZMW 1
 - Lower: ZMW 0.5
 - 0

Observed Willingness-to-Pay



- 95% of caregivers were willing to try out SQ-LNS for free
- 50% were willing to pay ZMK 0.5
- 20% were willing to pay ZMK 2 or ZMK 3

SQ-LNS Consumption Observation

- **Objective:** Better understand SQ-LNS consumption patterns
- **10-hour home observation**
 - Child feeding practices (SQ-LNS and other foods)
- **Four observation rounds**
 - Round 1: April 2022 - End of lean season (n=145)
 - Round 2: Sept 2022 - Post-harvest season (n=144)
 - Round 3: Jan 2023 - Beg. of lean season (n=145)
 - Round 4: May 2023 - Beg. of harvest season (n=146)

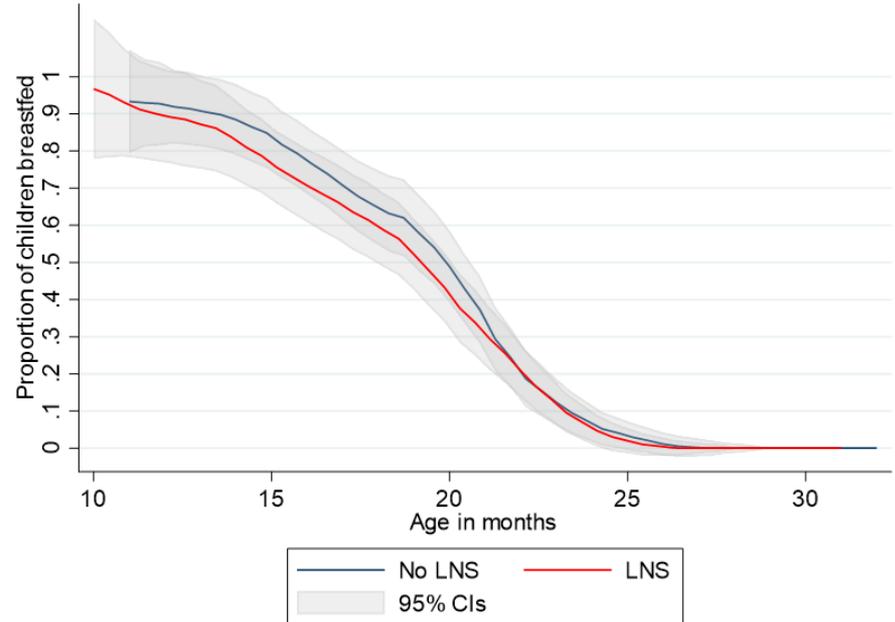
SQ-LNS Consumption Insights

- Relatively high compliance across rounds - 67%
 - For reference, self-report and disappearance data average 89% (Dewey et al 2021)
- Low levels of sharing across rounds - 11%
 - 14% for combined group
 - 9% for SQ-LNS only group
- 92% of children consumed the entire sachet
- Most children consumed LNS direct from sachet
 - Children in combined group 37% more likely to mix LNS with other foods

Breastfeeding Trends

- At 10 months 100% of children breastfed
 - <10% by 24 months of age
- SQ-LNS not displacing breastmilk
 - LNS children ~2-3 percentage points less likely to be breastfed (not significant)

Breastfeeding by Age and Treatment



Ongoing Analysis & Next Steps

- Biomarkers
 - Assess the effect of SQ-LNS on biomarkers of systemic inflammation, environmental enteric dysfunction (EED), and the gut microbiome
- Eye tracking (visual attention)
 - Analyze endline data on saccadic reaction time as another measure of child development
- Diet and feeding practices
- Dissemination and discussion with stakeholders in Zambia

Thank you!

dparkerson@poverty-action.org





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www.poverty-action.org

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