

Got baby food?

Understanding the market for packaged complementary foods in developing countries

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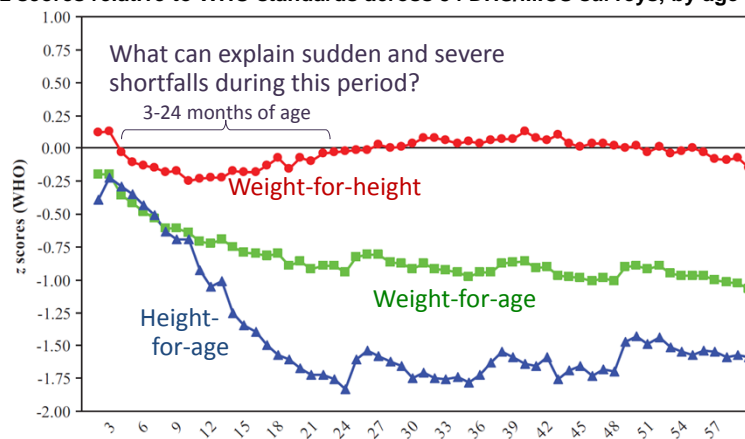
Friedman Seminar

Wednesday, February 3rd 2016



Much of the world's growth faltering is experienced from around 3 to 24 months of age

Mean z scores relative to WHO standards across 54 DHS/MICS surveys, by age (1-59 mo.)



Source: CG Victora, M de Onis, PC Hallal, M Blössner and R Shrimpton, "Worldwide timing of growth faltering: revisiting implications for interventions." *Pediatrics*, 125(3, Mar. 2010):e473-80.

Many factors could cause this pattern of onset and duration

- For example:
 - Exposure to pathogens
 - Expression of earlier deficits
- ...but also inadequate nutrient intake

Mean intake as a percentage of WHO recommended needs, by age

		6–8 months	9–11 months	12–18 months
Energy	(kcal)	84%	90%	91%
Protein	(g)	89%	99%	88%
Calcium	(mg)	66%	69%	78%
Iron	(mg)	33%	44%	75%
Vitamin A	(IU)	535%	663%	443%
Vitamin B1	(mg)	59%	67%	60%
Vitamin B2	(mg)	48%	50%	35%
Niacin	(mg)	53%	41%	44%

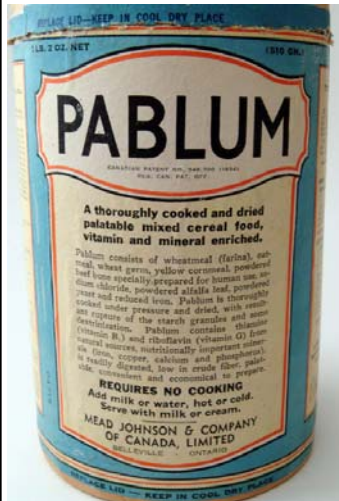
Note: Data shown are mean values for a sample of 400 children in Eastern Ghana.
 Source: C.A. Nti and A. Lartey (2007). "Young child feeding practices and child nutritional status in rural Ghana."
International Journal of Consumer Studies, 31: 326-332.

What could make it difficult to reach nutrient adequacy?

- Total quantity of food needed is very small (<50g/day to start)
 - daily cost of adequate quantity is low, even for poor households
- ...but infants have small stomachs relative to potential growth velocity
 so adequate complementary foods must have different *qualities*
- What attributes are needed to reach adequate nutrient intake?
 - higher nutrient density and digestibility than family foods
 - more frequent feeding than other family meals
- Every culture has traditional approaches to complementary feeding
 - starchy staples may be germinated, fermented etc. for digestibility
 - other ingredients added for protein, fats and micronutrients
- Getting it right costs more than money
 - time to prepare special foods 3-5 times per day
 - information about which foods have adequate density

How can sufficient nutrient density be reached consistently, given caregivers' constraints?

Toronto Hospital for Sick Children, 1931



How can sufficient nutrient density be reached consistently, given caregivers' constraints?

Toronto Hospital for Sick Children, 1931

INCAP, 1961



How can sufficient nutrient density be reached consistently, given caregivers' constraints?

Toronto Hospital for Sick Children, 1931



INCAP, 1961



Various soy blends since 1970s



...and since 2010, SuperCereal+



How can sufficient nutrient density be reached consistently, given caregivers' constraints?

Toronto Hospital for Sick Children, 1931



INCAP, 1961

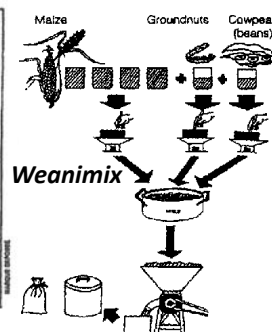


Home and artisanal production projects, 1980s

Burkina Faso, 1983



UNICEF in Ghana



Soy blends and SuperCereal+

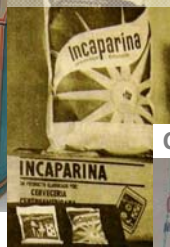


How can sufficient nutrient density be reached consistently, given caregivers' constraints?

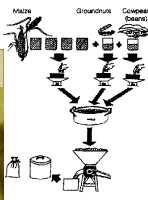
Toronto Hospital for Sick Children, 1931



INCAP, 1961



Home and artisanal production projects, 1980s
Weanimix Misola



Cereal-soy blends



SuperCereal+



Many small-scale millers making infant cereals since 1990s



So what products are most widely available in low-income countries?



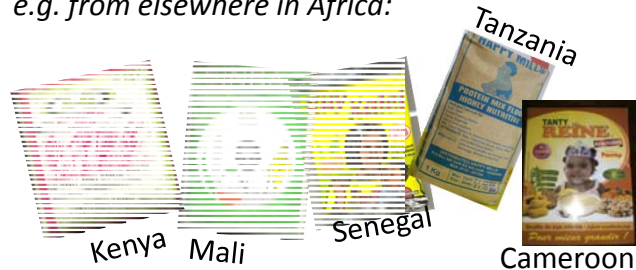
Accra, Ghana (2010)

One can find *many* alternatives out there

*In Ghana,
generic weanimix*



*Local grain millers' brands,
e.g. from elsewhere in Africa:*



*And various
multinationals,
typically sold in
supermarkets
and pharmacies:*



How do economists explain persistence of fancy brands when equally-good alternatives are known to exist?

Advertising.

- Fancy brands may signal social status
 - sometimes plausible, but can't explain private use by the poor
 - Fancy brands may be bought by mistake
 - sometimes plausible, but how often can people be fooled?
 - Fancy brands provide quality assurance
 - George Akerlof won Nobel in 2001 for this explanation
 - If buyers can't see qualities that sellers control, they rely on trust
 - Trust is earned through brand identity, which allows persistently high prices
 - Examples include specialized legal or medical services, education etc.
 - Infant foods are subject to this kind of market failure
 - Nutrient densities cannot be seen, even during or after feeding
 - Many confounding factors affect child's appetite, health and growth
- => **The only remedy is 3rd party quality testing and certification**

Here is the market I studied first:

All infant foods for sale in Bamako, Mali (1999)

Brand name	Packaging	Retail Prices (FCFA/unit)*		
		Mkt.	Stores	Pharmacy
Cérélac (wheat)	400 g. can	1400	1500	1615
Cérélac (wheat)	200 g. box	600		850
Cérélac (rice)	400 g. can		1600	
Cérélac (wheat/Banana)	400 g. can		1750	
Cérélac (wheat +3 fruits)	400 g. can			2240
Blédilac** (wheat)	250 g. can			1270
Blédina** lactée fruits	250 g. box			1830
Farinor** (maize/soy)	400 g. box		1690	1750
UCODAL (e.g. Sinba)	200 g. bag		200	
MISOLA	500 g. bag			300

All branded imports charged much more than local products, which could be just as nutritious ...but despite low cost had very few sales, except to institutional buyers

Of the branded imports, only Cerelac was widely available.

D. Sanogo and W.A. Masters (2002), "A market-based approach to child nutrition: mothers' demand for quality certification of infant foods in Bamako, Mali," *Food Policy*, 27(3): 251-268.

How do we know why consumers choose Cerelac?

A market experiment in Bamako, Mali (2000):

The question is,

Why would women buy this?
Cerelac (400 g. cans)
 1617 FCFA = \$2.49



Instead of this?
Sinba (2 x 200 g. bags)
 2 x 200 FCFA = \$0.61



Or just raw ingredients
 to mix at home...

W.A. Masters and D. Sanogo (2002), "Welfare Gains from Quality Certification of Infant Foods: Results from a Market Experiment in Mali", *American Journal of Agricultural Economics*, 84(4): 974-989.

How do we know why consumers choose Cerelac?

A market experiment in Bamako, Mali (2000):

In very low income peri-urban areas, used market intercepts to recruit 240 mothers with infants



We gave participants a can of Cerelac, then offered to swap for increasing quantities of other infant foods

The experiment allowed people to reveal their preferences one step at a time

We asked them to compare:

- The well-known brand (*Cerelac*, in 400 g. metal canister)
- A sealed, “certified” mix (*Certilac*, in 400 g. plastic bag)
- An open, unidentified mix (*Anonymous*, in open bags)
- Raw materials in fixed proportions (*Ingredients*, in open bags)

the only difference is:



To avoid response bias, these were real decisions; respondents took home one of their actual choices



On average, the mothers in our experiment cared about product certification almost as much as processing

Mean willingness to pay for product:

- Certilac: 1160 FCFA
- Generic: 705 FCFA
- Ingredients: 120 FCFA

Implied willingness to pay for the difference:

455 FCFA for certification
(= \$0.70 per 400 g. bag)
585 FCFA for processing
(= \$0.90 per 400 g. bag)

We also estimated the cost of certification

- We found that:
 - introducing certification would be worth at least \$20 per year per child needing infant foods (between 6 mo. and 2 yrs. of age)
 - this amounts to a value of about \$1 million per year for the city of Bamako as a whole
- This is money that they're still not getting
 - fifteen years later, still no certification systems in place

A decade later in 2010, DFID funded a scoping study to revive the question for Ghana...

- This time, we could address two other questions:
 - Are the locally produced infant foods actually available?
 - Are the locally produced infant foods actually high quality?
- Our economic theory has clear predictions:
 - After start-up the products will be rarely available, because buyers will be skeptical about quality
 - and skepticism will be justified, because quality will be low and variable since the sellers lack motivation to keep it high

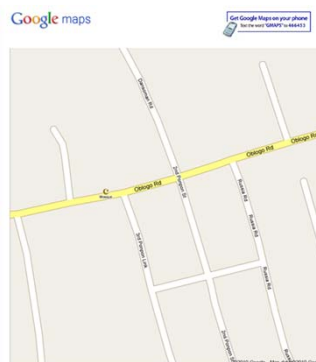
Here is the full range of what I bought
from diverse vendors around Accra in 2010



Question #1: Are local infant foods as available as Cerelac?

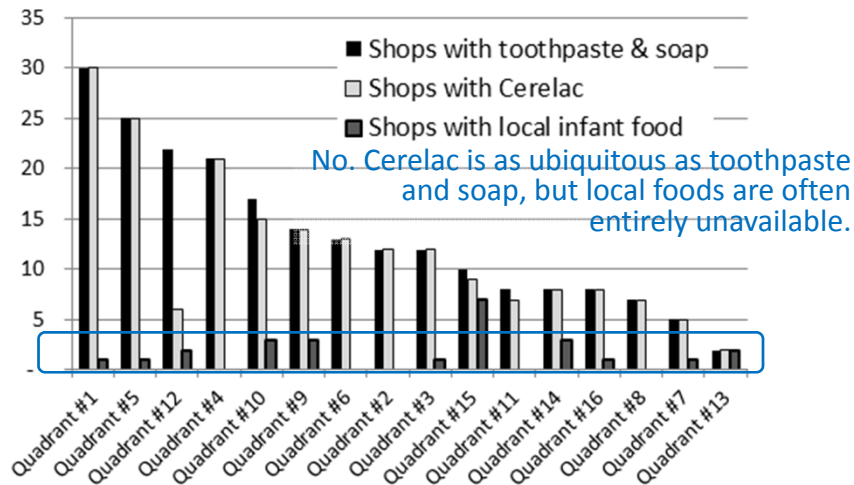
- This is a difficult question...
- To answer in terms of Greater Accra as a whole, we divided the city into quadrants defined like this:

[http://maps.google.com/maps?
&ll=5.558740,-.253961
&spn=0.0025,0.0025
&pw=2](http://maps.google.com/maps?&ll=5.558740,-.253961&spn=0.0025,0.0025&pw=2)



- Then randomly generated latitude and longitude locations and visited each one until we found over 200 shops to judge...

Are local infant foods as available as Cerelac?



Source: W.A. Masters, J. Kuwornu and D. Sarpong, "Improving Child Nutrition through Quality Certification of Infant Foods: Scoping Study for a Randomized Trial in Ghana." London: International Growth Centre Working Paper, February 2011.

Question #2: Are local infant foods as good as Cerelac?

- To answer, we took 14 samples and sent them without labels to a commercial lab in Omaha
- We did proximate analysis for macronutrients, plus iron & zinc



Nutrient density often exceeded
international benchmarks
but often didn't.



More nutrient-dense than
international benchmarks



Less nutrient-dense than
international benchmarks

We had visited several of these manufacturers,
and were surprised:



This producer's mix had
similar nutrient density to
international benchmarks



This product had *much*
lower fat, implying little of
the claimed soy content

So...
Locally produced foods *could* be widely available at much lower cost and similar nutrient density as Cerelac

- ...and yet they are not.
 - they are rarely available, and when found their quality is variable
 - certification could help them be more widely sold with higher quality
- There is no demand for quality certification.
 - public agencies do their own inspection and testing, e.g. for SuperCereal+
 - richer households can buy enough of the multinationals
 - potential beneficiaries don't know it would help them
- This is a classic market failure.
 - the remedy is clear enough, but policy depends on politics
- How were existing quality assurance programs created?
 - public (e.g. FDA) and private (e.g. UL) introduced after scandals
 - international programs (e.g. ISO) used for new attributes
- What might alter policy and grantmaking in this domain?

The latest project, funded by IFPRI,
with Friedman students Winnie Bell and Marc Nene:
What's for sale now, and is it any good?

- A global catalog of packaged complementary foods:
 - All products found by our collaborators around the world
 - Criterion: sold as complement to breastmilk, for >6 months of age
 - Typical product is precooked, in packages of 100-500g
- Random sampling to test for nutrient composition
 - Budgeted to sample 100 products from 20 countries
 - Test for protein, fats, calories, iron and zinc
 - Actually able to test 108 products from 22 countries

Results from 108 products in 22 countries

Samples are from Africa (18) and Asia (3), plus Haiti

Table 1. Number of samples by country of purchase

<i>Country</i>	<i>Number of samples</i>	<i>Country</i>	<i>Number of samples</i>
Benin	5	Kenya	5
Botswana	5	Madagascar	3
Burkina Faso	5	Malawi	2
Cameroon	5	Mali	7
China	1	Mauritania	3
Cote d'Ivoire	4	Morocco	2
DR Congo	1	Nepal	5
Ethiopia	12	Rwanda	6
Ghana	10	Senegal	4
Haiti	4	South Africa	6
Indonesia	8	Uganda	5
<i>Total number of countries</i>		22	
<i>Total number of samples</i>		108	

Source: Masters, Nene and Bell (2016), in progress.

Results from 108 products in 22 countries

Greatest variance is in micronutrients
Fat content also varies widely

Table 2. Summary Statistics for 108 complementary foods from 22 countries

<i>Nutrient</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Minimum</i>	<i>Maximum</i>	<i>SCP Standard</i>
Macronutrients					
Calories (kcal)	419.1	16.0	378.6	466.2	410.0
Fat (g)	5.7	3.1	0.0	15.0	9.0
Protein (g)	13.8	3.9	1.5	23.3	16.0
Carbohydrates (g)	78.1	6.4	62.4	97.5	na
Micronutrients					
Iron (mg)	9.9	8.9	0.0	61.3	13.5
Zinc (mg)	5.9	4.9	0.0	21.0	8.2
Other content					
Ash (g)	2.4	1.3	0.0	7.1	5.0
Moisture (g)	5.8	3.1	1.4	17.8	7.0

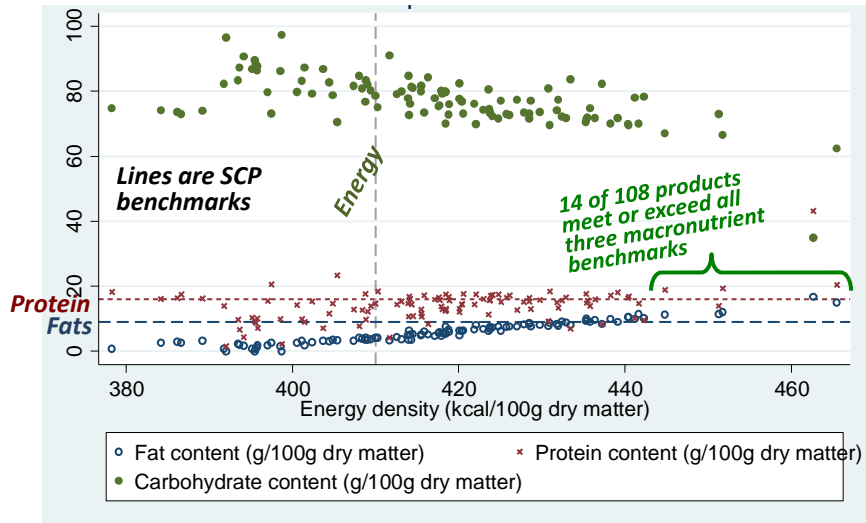
Note: All data shown are nutrient content per 100 grams of dry matter, except for moisture which is per 100 grams of product as purchased.

Sources: Authors' test results from Midwest Laboratories, Lincoln NE, except for the Super Cereal Plus (SCP) standard which is from WFP (2014) and Webb et al. (2011), specifying allowable minimums for each nutrient and maximums for moisture and ash.

Source: Masters, Nene and Bell (2016), in progress.

Macronutrient results

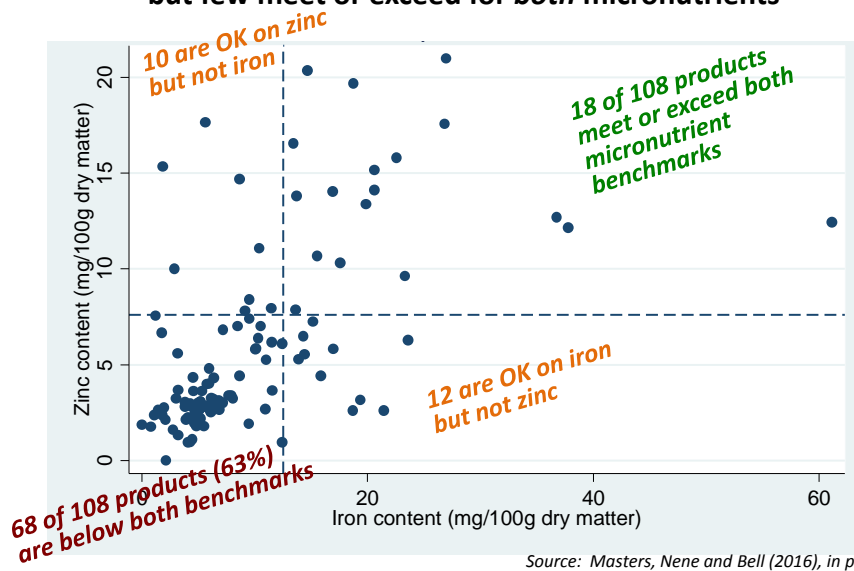
Many products exceed SuperCereal+ benchmarks, but few meet or exceed for *all three* macronutrients



Source: Masters, Nene and Bell (2016), in progress.

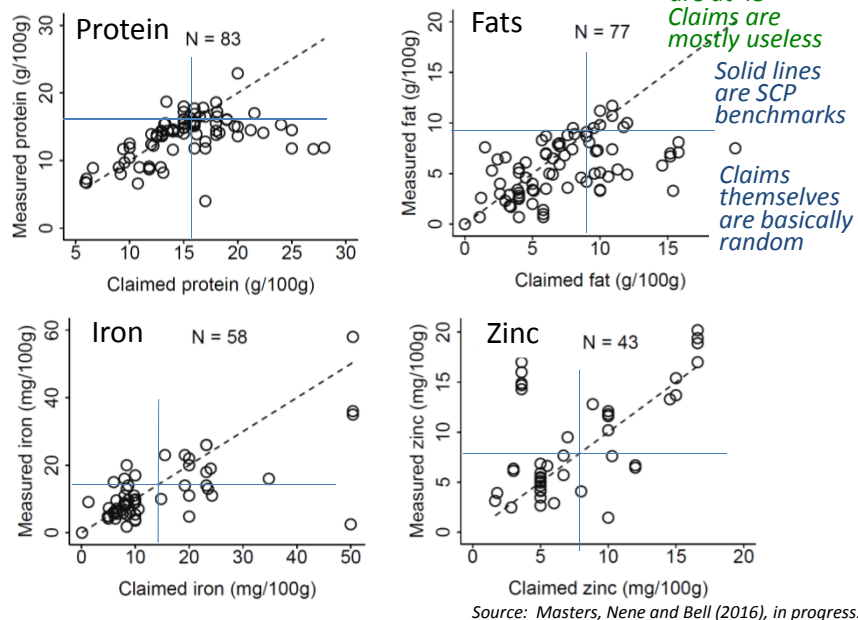
Micronutrient results

Many products exceed SuperCereal+ benchmarks, but few meet or exceed for *both* micronutrients

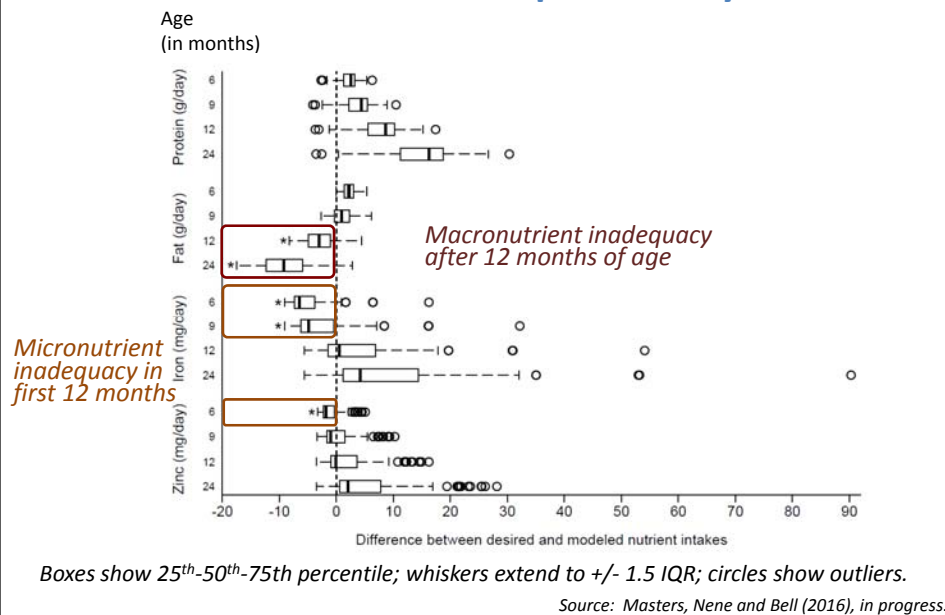


Source: Masters, Nene and Bell (2016), in progress.

Some packages have nutrient fact claims. How accurate are they?



What would happen if a child consumed only breastmilk plus these complementary foods?



Conclusion:
Locally made packaged complementary foods
can have adequate nutrients
but they usually don't

- To remedy market failure, would need quality assurance
- Effectiveness could be measured by an RCT
 - 1) Establish an Infant Nutrition Quality Assurance Project (INQAP)
 - 2) Recruit millers to participate, and issue time limited *INQAP-OK* stickers
 - 3) Roll out billboards and demonstrations at randomly-chosen markets
 - 4) Use surveys and growth monitoring to track food purchases & infant growth
 - 5) Use child's age at the time of market advertisements to identify causal effect of certification on growth
- Will keep submitting proposals for research
 - But would an RCT showing benefit really cause policy change?
 - what information is most likely to alter policy and grantmaking?
 - Research can identify and explain the puzzle, but that's just a start!

Acknowledgements

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Thank you!

