

Standing Tall and Growing Strong:
Effective Investments in the Early Years

Emanuela Galasso

Development Research Group

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A remarkable body of evidence built over the past decade...

- “Hundreds of millions of children under age 5 in low-income countries are not achieving their full developmental potential due to poverty, **nutritional deficiencies, and inadequate stimulation**”.



Series

Maternal and child undernutrition and overweight in low-income and middle-income countries

THE LANCET

2008, 2013



Series

Developmental potential in the first 5 years for children in developing countries

2007, 2011

Inequality in early childhood: risk and protective factors for early child development

The case for investing early

- Research on human capital formation: highest returns to “high quality” early investment

<http://heckmanequation.org/>

- Research on developmental science: Using brain science to design policy

<http://developingchild.harvard.edu/>



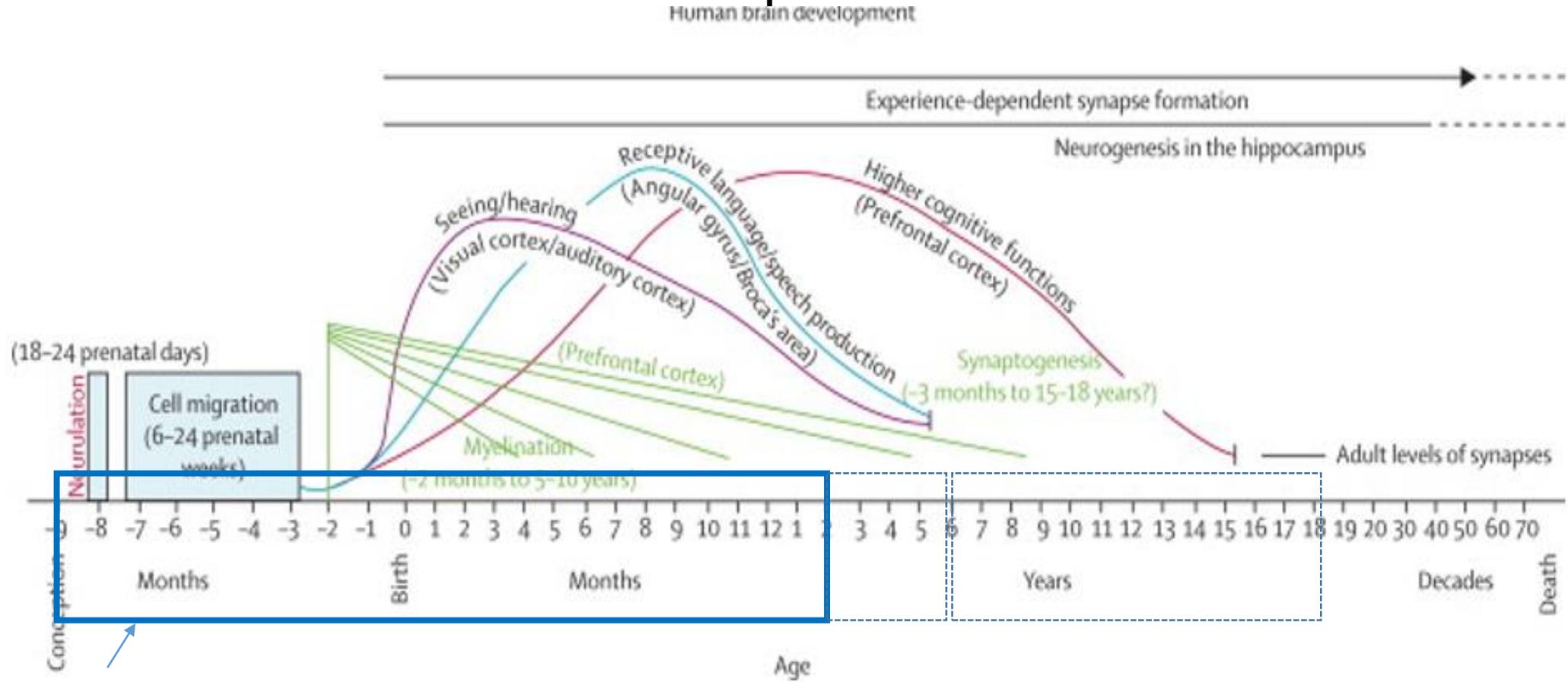
The case is compelling. The task is complex but doable in middle and low income countries...
... with a large research agenda

The objective of this presentation is to:

- 1) Summarize the case for investing in nutrition and early stimulation
- 2) Provide an overview of the effectiveness of a range of policies
- 3) What is 'high quality'? Distill lessons on how to think about design and implementation to maximize effectiveness
- 4) Highlight remaining knowledge gaps and areas that need further investigation

Part I: Motivation

The cumulative nature of brain development: critical and sensitive periods



will focus on this age window

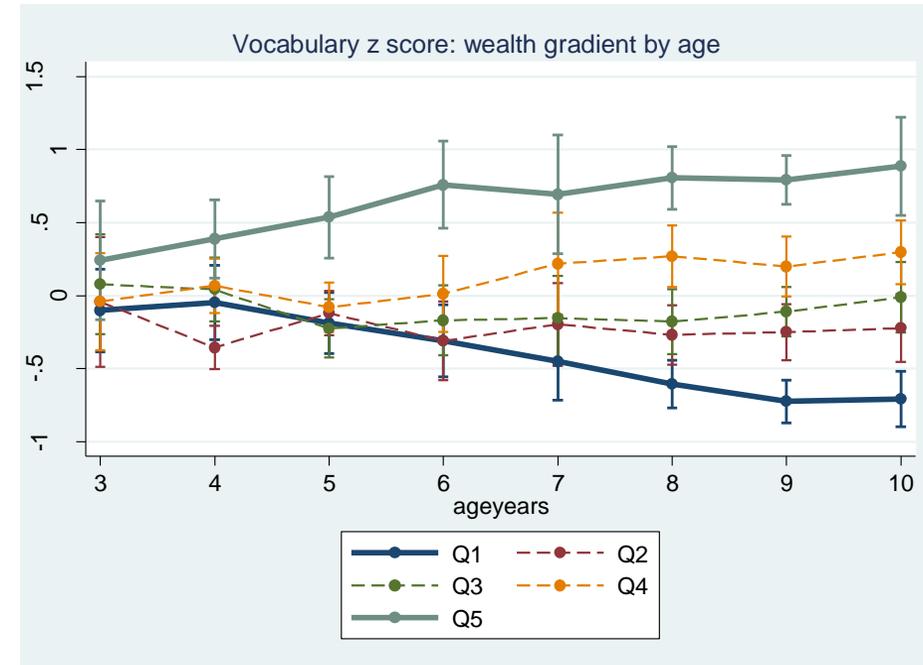
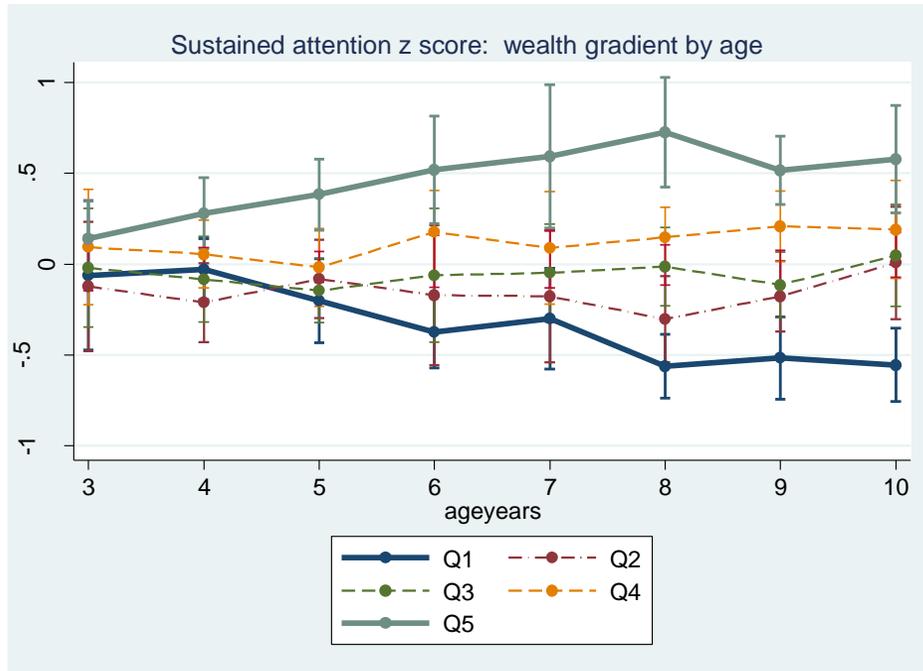
Nutrition and early stimulation are necessary for brain development

1. Key nutrients during pregnancy and first two years of life
 - iron, zinc, fatty acids, micronutrients. Dietary intake: quality vs food quantity
2. Protection from infections/toxins. Repeated infections due to diarrheal diseases, environmental enteropathy, parasites
 - Appetite loss, reduced food intake, lack of absorption of nutrients
3. Early stimulation: experience shapes early brain wiring and function
 - Poverty and stress disrupt the balance between emotional automatic reactive processes and development of higher cognitive function (executive function)
 - circuits/synapses gets pruned if not exposed to high quality environments
 - Positive and sensitive caregiving provide critical protective role

The window of opportunity for nutrition is shorter than for early stimulation.

- **For nutrition: first 1000 days** - pregnancy and first two years of life (Victora et al 2008) – is the period of highest velocity in physical growth (height)
 - Height reflects early life health and nutrition. Both help brain to grow
 - Catch-up in height (and cognition) after age 2 is possible but unlikely (about 20%), policy levers unknown, and to be weighted against higher likelihood of chronic illnesses in adulthood (Horta et al 2009)
- **For early stimulation: up to age five** is the period of highest brain plasticity
 - Catch-up is possible but costlier, given the large window of maturation of higher cognitive functions until late adolescence

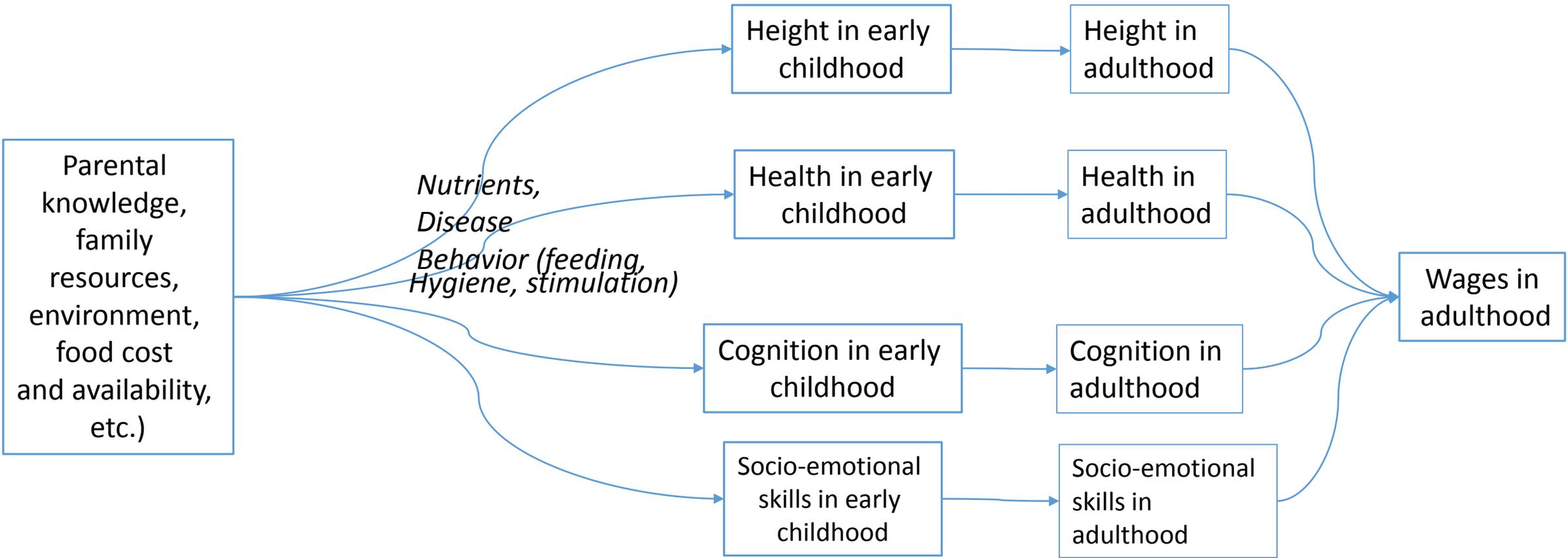
Equity and shared prosperity: investing early can prevent learning gap



- Large socio-economic gradients in childhood development outcomes emerge early
- widen with age before school and map into sizeable learning gaps
- Larger in domains that involve higher cognitive function
- Mirrors US evidence (Knudsen et al 2006) Latin American evidence (Schady et al 2015)

Part II: Channels and costs of not investing?

Organizing framework: potential lifelong benefits



Productivity channels: Quantifying the costs of stunting during childhood

Focus on Stunting (height/age below 2 SD reference population)
b/c still the strongest correlate of impaired brain development,
with long term consequences

Question: How much lower is current income due to childhood stunting among of the adult labor force today?

Income penalty =
Schooling penalty +
Cognition penalty +
Height penalty
(in the labor market)

Productivity channels: Quantifying the costs of stunting during childhood

Use a development accounting framework

Income penalty = labor share *

[effect of stunting on completed schooling*returns to schooling +
effects of stunting on adult cognition*returns to cognition +
effect of stunting on adult height*returns to height]

* childhood stunting

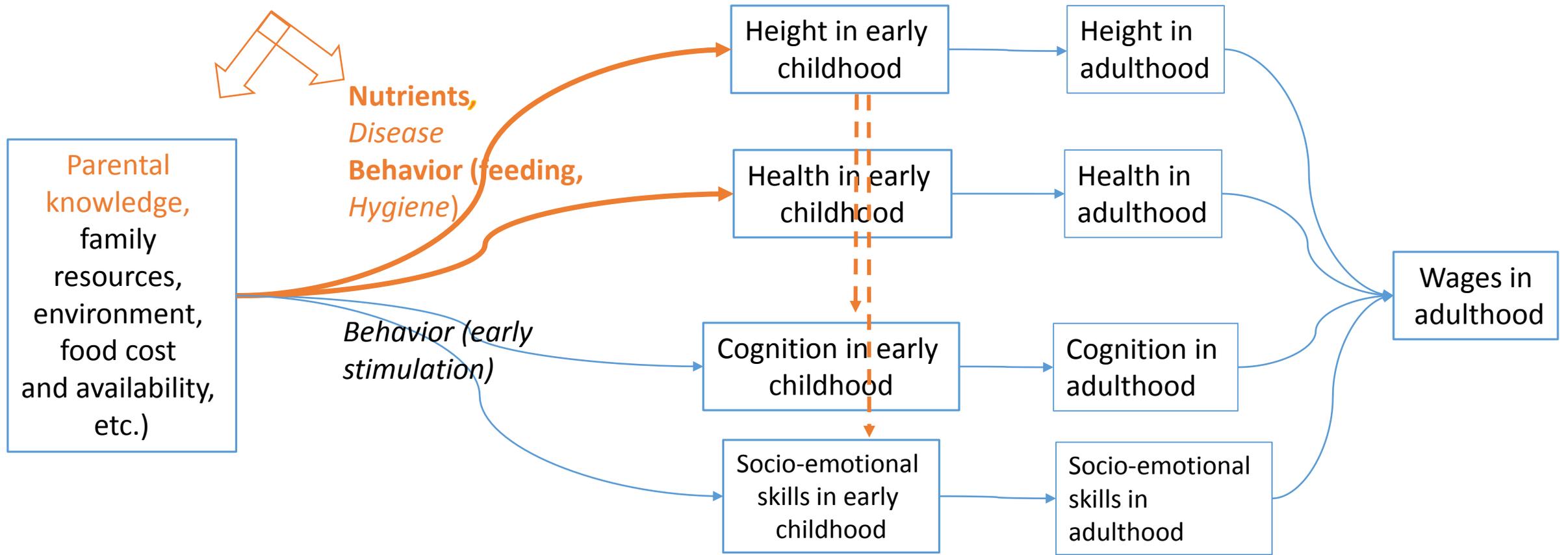
Sample of 124 countries Joint Child Malnutrition Estimates (Unicef, WHO, WB)

Productivity channels: summary

- Average income penalty from having workforce that was stunted during childhood is large (macro-relevant).
 - Estimates forthcoming (Galasso, Wagstaff, with Shekar and Nadeau, 2016)
 - with larger costs in regions with higher prevalence of stunting/higher returns to schooling
 - These are private labor markets returns
- Effects could be even large, as above not accounting for:
 - Social returns to education
 - More educated workers better placed to innovate/adopt new technologies
 - More educated mothers (fertility, quality of parenting)
 - Intergenerational effects
 - Stunted mothers are more likely to give birth to stunted children
 - General equilibrium effects

Part III: Policy options: how to prevent stunting and promote early stimulation? How effective are they?

III.1 Direct nutrition interventions: affecting height and health with cascading effects



Direct nutrition interventions: how effective are they? Impact on stunting

Bhutta et al (2013) propose a nutrients and behavioral change package

- Universal: salt iodization
 - Pregnant women: multiple micronutrients (with iron-folate), calcium supplementation, energy/protein supplementation
 - Children: vitamin A and zinc supplementation, treatment of severe acute malnutrition
 - breastfeeding promotion, nutrition education and complementary feeding with nutrition education
- to be scaled up to 90% coverage during the first 1000 days
 - and simulate impacts: ↓in global stunting by 20%
 - (in addition to impact on child survival)

Direct nutrition interventions: how effective are they? Impact on cognition

- Yet, a subset of interventions in the Bhutta et al package affect cognition *without* affecting height or stunting
 - salt iodization (0.49 SD), multiple micronutrients (0.3 SD), breastfeeding promotion (0.27 SD)
- (Note that recent literature suggests also including other interventions that have been shown to affect cognition and not stunting, as they are cheap: deworming (0.3 SD), immunization (0.5 SD))

Direct nutrition interventions: high internal rates of return but not sufficient to reach SDG targets

Use same framework to obtain the benefit stream from the direct nutrition package through both cognition and stunting:

Benefits stream = labor share *

{[returns to schooling* *early stunting on completed schooling* +
returns to cognition * *early stunting on adult cognition* +
returns to height * *early stunting on adult height*] * policy impact on stunting +
[returns to cognition * *early cognition on adult cognition*] * policy impact on cognition}

And compare net present value of benefits and costs

- The package has high internal rates of return depending on the parameters assumption.
- Yet, insufficient to reach SDG stunting target over medium time horizon.
- Moreover, 90% coverage with same quality and cost is ambitious

Challenge in scaling up direct nutrition interventions: supply side considerations

- Direct nutrition interventions delivered through the primary health care system (and through community based interventions for outreach or when there are access constraints)
- The supply side plays a key role:
 - Peru: performance-based budgeting, careful planning from bottom up regular health visits, geographical targeting (content/human resources, materials) (Huicho et al 2016, Marini and Arias 2016)
 - Zimbabwe: pay for performance on maternal child health targeted at primary health clinics reduced extreme stunting by 4pp (Friedman et al ongoing)

Challenge in scaling up direct nutrition interventions: coverage with quality

- Community based nutrition program in Madagascar lost impact when scaled up from 1/3 to 2/3 target population nationwide 2007-2011
 - Nutrition education program, with referral to health centers
 - early program (1/3 coverage) translated into reduction in underweight
 - After scale up early program, under same financial resources, early program continued to be effective, the late program did not have an impact
- **Why?**
 - selection of community workers: lower cognitive capacity (decentralized)
 - Lower quality of training (curriculum too abstract and lacking practical demonstrations)
- Message fed back into design from 2012 onwards, with strong focus on ensuring quality at scale (Human Centered Design)

Challenge in scaling up direct nutrition interventions: more to be done

Active research/operation agenda on incentives and capacity of frontline workers and health personnel:

- Recruitment/selection
- Training: content of curriculum (more later), length/frequency training
- Motivation: salary, non-monetary benefits (echoes Ashraf, Bandiera's work Zambia)
- Workload (worker/children ratio), tasks per worker
- Supervision/coaching and support
- Need iterative learning, rapid prototyping/testing and mechanism experiments (Ludvig, Kling, Mullainathan 2011) to complement traditional impact evaluations

Addressing the disease environment: the challenge of stand alone interventions

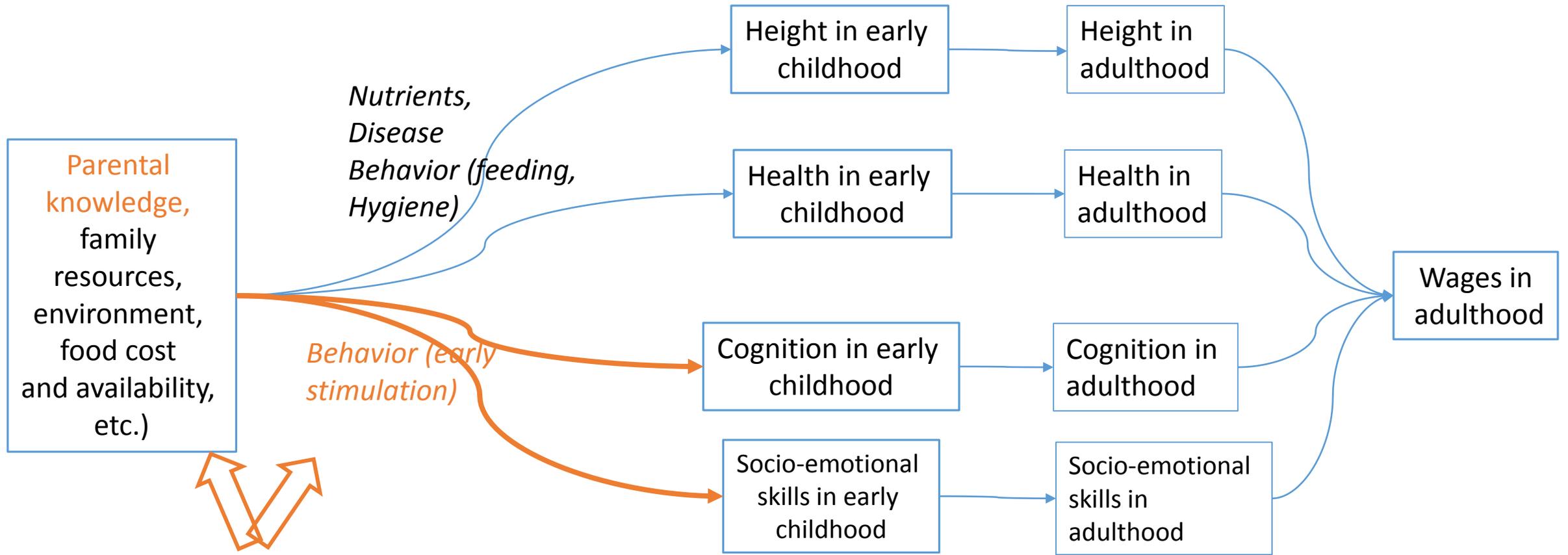
Policies aimed at providing protection from diseases by reducing infection and inflammation:

- Water supply infrastructure (new/improved access) or improved water quality
 - Sanitation infrastructure (new or improved access)
 - Hygiene: Behavioral change (promote handwashing after defecation or prior to handling food, latrine use)
1. **Meta analyses so far show No average effect** on height (0.08 SD), though impact on child mortality and diarrhea incidence.
 2. **Why?**

Assessing the disease environment: how to make policies more nutrition sensitive?

- Need universal coverage to account for externalities in contamination and re-transmission of pathogens (Guiteras et al 2015, Gertler et al 2015)
- 1st complementarity: Water and sanitation are complementary (Duflo et al 2015)
- 2nd complementarity: Need both sanitation infrastructure and behavioral change to obtain meaningful effects on height (Gertler et al 2015)
- Behavioral change needs to be carefully designed (e.g. Mali's/India's community-led total sanitation campaign)
- 3rd key complementarity: tackling nutrition and disease simultaneously

III.3 Promoting behavioral change in early stimulation



Promoting early stimulation: what do we know?

Policies that reduce the costs of stunting/enhance returns to nutrition interventions or independently promote child development outcomes:

- Home visiting: structured, target mother-child interaction, build parenting skills incrementally. Age-appropriate activities planned for each session
- Group parenting: encourage peer support, change norms about child development within communities, opportunities to learn from each other
- Or a combination of the two above

Meta analyses so far: sizable effects on child development (0.4SD)

- Evidence so far is only from small scale efficacy/effectiveness studies, hence no evidence at scale (Grantham-McGregor et al 2014, Aboud Yousafzai 2015)

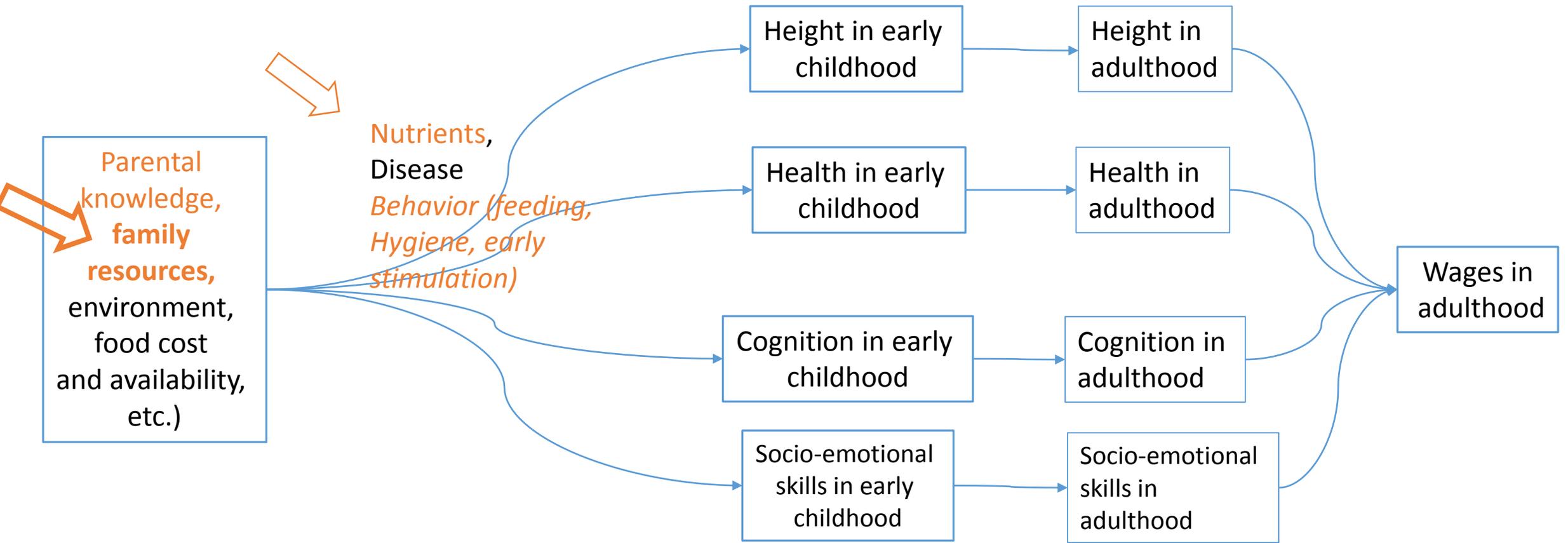
Promoting early stimulation: open questions

1. Are nutrition and early stimulation interventions substitute, additive or synergistic?
 1. Complementarities in benefits? economies of scope? Co-targeting, or co-delivering
2. *Whom* to target with *what* and *when*? Tailor to context
3. Will the impact be sustained in the long term? Mechanisms
4. How intensive? Cost?
5. Same challenges on content and training/motivation of frontline workers

Assessing complementarities b/w nutrition and early stimulation: ongoing work

- Ongoing trial intensifying scope and cost embedded in a program at scale in Madagascar:
 - Intensifying nutrition education -> counseling
 - Nutrition counseling + preventive nutrient supplementation (from pregnancy to 18m)
 - Nutrition counseling + preventive nutrient supplementation (to children 6-18m)
 - Nutrition counseling & home visiting early stimulation
 - Control – community growth monitoring status quo
- Timing of the intervention
- Timing/duration of the supplementation
- Complementarities nutrition and early stimulation

III.4 Social protection and agriculture policies: addressing underlying determinants



III.4.1 Addressing underlying determinants in social protection: tackling poverty and vulnerability to shocks

- Social protection provides a large scale platform to target families at risk of malnutrition (Alderman, Ruel 2016, Alderman 2015). Is income a constraining margin?
 1. Income transfers – increase calories and improve quality of the diet
 2. Food subsidies – potential role for fortified food / in-kind assistance
 3. Protection/mitigation from long term negative consequences of shocks during the critical age window (Giles, Satriawan 2015)

Addressing underlying determinants in social protection: what do we know?

1. **Meta analyses so far show No effect** of UCT/CCT on height (0.04 SD)

(Mainley et al 2013, Ruel and Alderman 2013) and **mixed effects** on child development

- positive shifts in food composition, stimulation and preventative care
- Yet small/moderate effects on child development (Paxson, Schady 2010, Fernald Hidrobo 2011, Macours, Schady, Vakis 2012, Barham, Macours Maluccio 2013), positive effects on stunting in Philippines (Kandpal et al 2016) but no effect in Niger (Premand et al 2016)

2. **Why?**

Addressing underlying determinants: how to make social protection policies more nutrition-sensitive?

Key factors to enhance nutrition sensitivity in social protection (Alderman 2015):

- target the first 1000 days: poverty targeting not always aligned
- target females
- Key complementarity in access to health care, water and sanitation (what)
- Critical role of quality behavioral change component (how: design and implementation)

III.4.2 Addressing underlying determinants in agriculture and livelihoods: what do we know?

- Agricultural interventions with a specific nutrition objective: home gardens, enhanced with micronutrient rich food, small livestock for animal-source food (Alderman and Ruel 2013)
 - Support livelihoods + promote dietary diversity in home consumption

1. Meta analyses so far show No effect on nutritional outcomes (including height). Evidence still thin, small scale studies

- Exception: biofortification crops (vitamin A orange sweet potatoes)

2. Why?

- Need to focus on nutrition education/behavioral change component
- Targeting women: own health, nutrition decisions and control over resources

III.5 Summary of knowledge gaps in policy

How to improve design and implementation to maximize impact and effectiveness?

Strong rationale for investing in research on:

- Sustaining quality at scale (how: implementation)
 - Capacity and competence of providers, quality of management, incentives
- Understanding complementarities across sectors (what):
 - Between direct nutrition interventions and WASH
 - Between nutrition and stimulations interventions
 - Between social protection/agriculture and nutrition (nutrition-sensitive)
- Understand how to design behavioral change (how) – more later

Part IV: Zoom in on behavioral change

Behavioral change is a key necessary (but not sufficient) condition for nutrition and early stimulation interventions to be effective.

- As Duflo's #1 Tanner Lecture "Paternalism vs Freedom" beautifully articulates:
- *"We often adopt a somewhat patronizing tone when thinking about the poor: why are they not boiling their water? Why are they not immunizing their children? Why are they not saving for a rainy day? Why don't they have a more caloric diet? We can see that all those "right" choices are available to them, but we forget that they imply active choices, when the "wrong" choices are hardly available to us. The freedom here is just the freedom to stumble." (p. 16-17)*
- A wide range of interventions can reduce the number of active choices that the poor have to make, so that they can focus on key behaviors/practices to care for and engage with the children.

Behavior is shaped by drivers such as information, beliefs and social norms...

- Information: chronic malnutrition is not visible; parents may not be aware of the effects of their behavior on child outcomes (eg. about the importance of talking to babies)
- Core beliefs about what it means to be a parent across contexts: parents may not be aware of their role as educators (ex. belief that child intelligence is exogenous) or not feel empowered to make decisions
- Social norms (ex. open defecation accepted, physical punishment accepted) or what is considered to be a normally 'healthy' child

Such drivers may constrain adoption of 'optimal' behavioral practices:

- Nutrition practices (exclusive breastfeeding, dietary diversity – number of food groups, animal-source food)
- hygiene practices
- Parenting practices (responsive feeding, responsive parenting, verbal stimulation, play activities/materials)

Piloting and adaptation to local context are critical

- to understand demand for services
- To promote sustained behavioral change

Three examples:

1. From information to supporting behavioral change: content and design messaging in the context of nutrition education
2. Overcoming social norms: group parenting in Senegal
3. Beliefs about parenting: group parenting and experiential learning in Chile

1. Information is not enough. From information to nutritional behavioral change



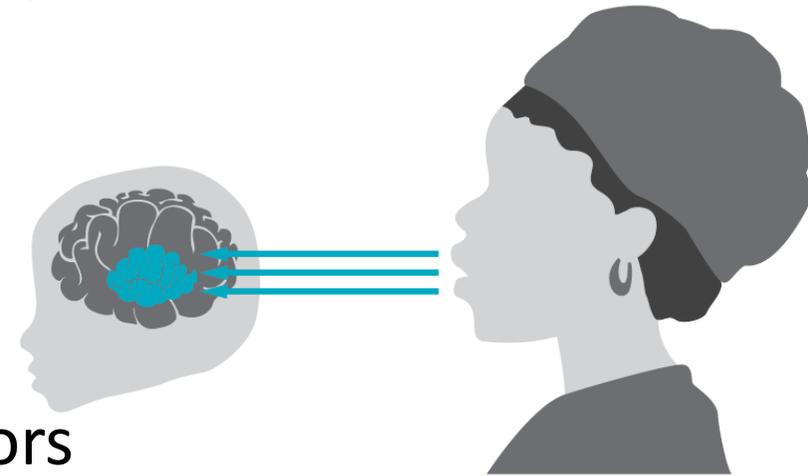
Mass communication campaign in Peru

Communication Principles

- 1 Recognize the reality of Mother's lives
- 2 Anticipate & proactively address obstacles
- 3 Highlight Benefits of behavior change
- 4 Don't try to say it all at once
- 5 Enable mothers to track Progress
- 6 Reward the adoption of positive behaviors
- 7 Amplify 'PROGRAM' messaging through village communications

2. The challenge of overcoming social norms through group parenting in Senegal

- When cultural norms discourage talking to babies or making eye contact...
- ... intervention was based on providing scientific explanations to overcome norms



- Program succeeded in changing caregivers behaviors
 - demonstrated improved skill/knowledge in play sessions
- But no difference in children's language experience during a typical day
- It takes time to overcome norms in a village

3. Shifting beliefs about parenting in Chile

- Evidence of socio-economic gradients in child outcomes being mirrored by gradients in practices and beliefs
- Intervention: Semi-structured group parenting, with facilitators trained in group dynamics and experiential learning

Results three years after the end of the program:

- Shifted beliefs
 - parental perceived self confidence
 - perceived social support
- ... behaviors
 - Improved stimulation practices
 - Improved positive parenting strategies
- ... and outcomes
 - Receptive language



Part V: Conclusions

Programs work with careful design and implementation...

1. The case for investing in the early years on equity and efficiency grounds is there
2. Yet the evidence so far shows substantial heterogeneity of impact (with many unsatisfactory programs)
3. We have pointed to key factors that have been associated with stronger positive results :
 - “What” Complementarities across interventions
 - “How” Quality of service delivery at scale
 - “How” Program tailored to context: designed behavioral change

...but knowledge gaps remain

- Need to strengthen the analytical and operational evidence on how to maximize impact and effectiveness at scale
- Which are complementarities essential?
- Which complementarities are more cost effective?
- Role of other mechanisms?
 - Female empowerment?
- How persistent are impacts?
 - Degree of static and dynamic complementarities between nutrition and child development.
- ...

Thank you!