

# **Costs of Inaction versus Costs of Action – or Benefit-Cost Ratios -- for Investing in Young Children Globally**

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Panel 6: Employing existing cost-benefit studies, what is expected to be the cost of inaction (or action) toward investing in young children globally, 17-18 April 2014

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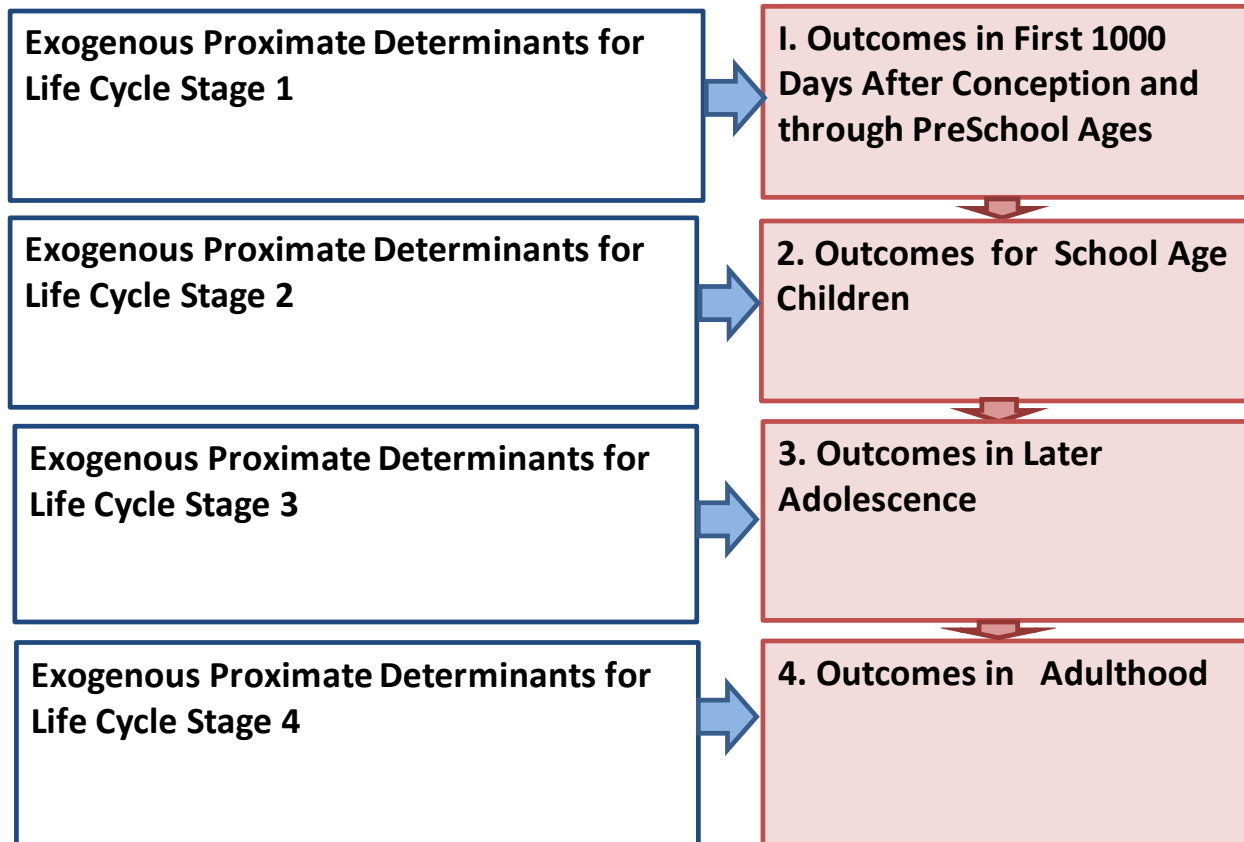
# INTRODUCTION-CRITICAL POINTS

- **Benefits = Costs of Inaction**
- **Benefits/costs may be effective guide for policies**
- **Benefits are likely multiple**
- **Costs of actions as important as benefits**
- **Life cycle perspective on both benefits and costs**
- **Policy motives: efficiency/productivity and distribution (poor, rights?)**

# BENEFITS

- **Benefits = Costs of Inaction = Positive gains or losses averted due to investment**
- **Benefits likely multiple so for summary measure need combine (weights)**
- **Benefits likely over the life cycle**
- Benefits may include higher survival but also depend on survival
- Future benefits in present terms and discounting

# Figure 1. Child Developmental Outcomes within a Life Cycle Framework



Source: Drawn by author.

# Table 1. Selected Associations between Infant Anthropometric Measures and Adult Outcomes

Schooling attainment	0.5 grades for 1 HAZ at age 2 0.5 grades for 1 WAZ at age 2 0.3 grades for 1 kg at birth
Adult height	3.2 cm for 1 HAZ at age 2 0.7-1.0 cm for 1 cm at birth
Labor income	8% for 1 HAZ at age 2 males 8-25% for 1 HAZ at age 2 females
Birthweight of offspring	70-80 g for 1 HAZ or 1 WAZ of mother at age 2

Source: Constructed by author based on Victora et al (2008).

# Table 2. Impacts of ECD Programs in Developing Countries

	Cognitive Skills Effect Sizes		
	Median	Range	No. Studies
Center-Based Preschool and Day Care	0.33	-0.14 to 1.15	14
Parent and Parent-Child Interactions	0.28	-0.05 to 0.80	8
Sources: Compiled from Engle et al (2007, 2011)			

- Benefits = Costs of Inaction = Positive gains or losses averted due to investment
- Benefits likely multiple so for summary measure need combine (weights)
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- **Benefits may include higher survival but also depend on survival**
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**Table 3. PDV of 1000 dollars Received with Various Lags at Alternative Discount Rates**

Discount Rate	3.00%	6.00%	10.00%
Lag in Years			
10	\$744	\$558	\$386
40	\$307	\$97	\$22
60	\$170	\$30	\$3



## Table 3A. PDV of 1000 dollars Received with Various Lags at Alternative Discount Rates, Adjusted for Survival Probabilities

Discount Rate	3.00%	6.00%	10.00%	Survival Prob
Lag in Years				
10	\$675	\$506	\$350	0.9067
40	\$252	\$80	\$18	0.8232
60	\$112	\$20	\$2	0.6615

Survival probabilities based on life tables for India.

**Table 4. Estimates of Present Discounted Values in U.S. dollars of 7 Major Impacts of Moving One Infant Out of LBW Status in a Low-Income Developing Country**

Impacts	Annual discount rate (%)		
	3	5	10
1. Reduced infant mortality	\$95	\$99	\$89
2. Reduced neonatal care	\$42	\$42	\$42
3. Reduced costs of infant and child illness	\$36	\$35	\$34
4. Productivity gain from reduced stunting	\$152	\$85	\$25
5. Productivity gain from increased cognitive ability	\$367	\$205	\$60
6. Reduced costs of chronic diseases	\$49	\$15	\$1
7. Intergenerational effects	\$92	\$35	\$6
Total Benefits	\$832	\$510	\$257
Source: Constructed by author based on Alderman and Behrman (2006)			

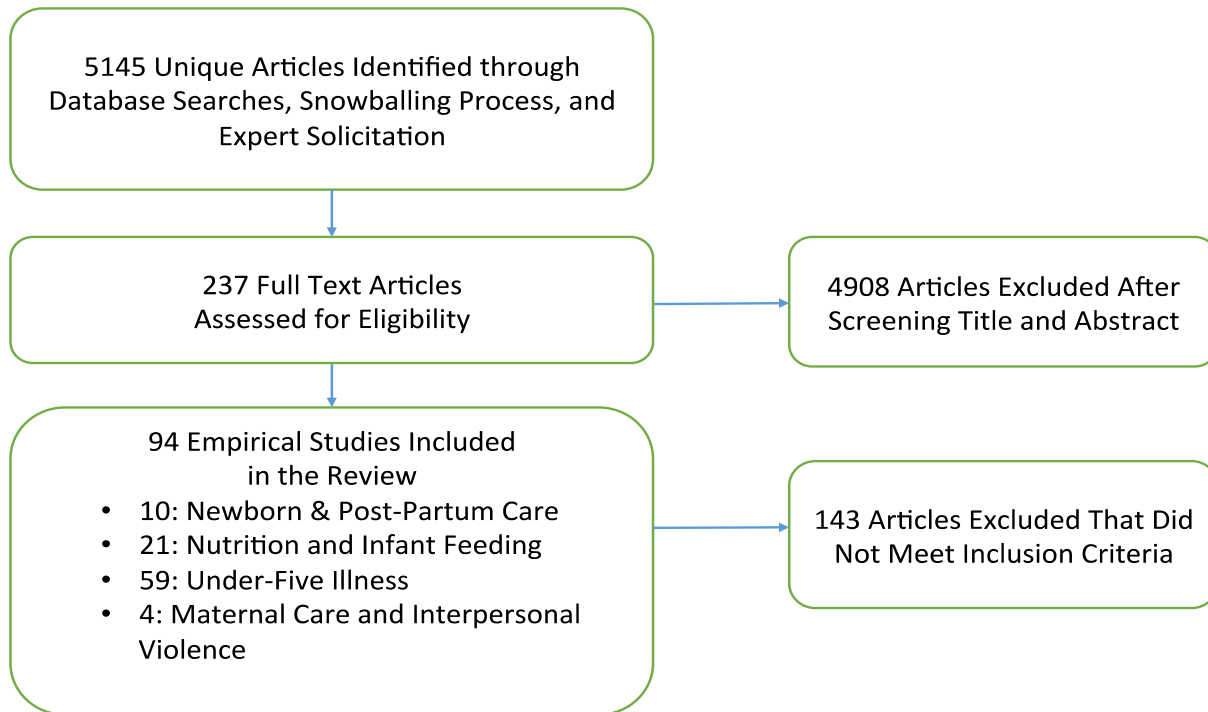
- **Heterogeneity across contexts (markets, policies, culture, resources)**
- **Social versus private benefits**
- **Micro versus aggregate effects**
- **Marginal benefits conditional on prevalence**
- **Considerable uncertainties**

# **COSTS**

- **Resource costs, NOT provider expenditures**
  - Not government budgets if transfers (e.g., CCTs)
  - Include private costs
  - Distortion costs
- **Costs likely multiple so for summary measure need combine (weights)**
- **Costs likely over the life cycle**
- **Costs also depend on survival**
- **Future costs in present terms and discounting**

- **Heterogeneity across contexts (markets, policies, culture, resources)**
- **Social versus private costs**
- **Micro versus aggregate effects on costs**
- **Marginal costs conditional on prevalence**
- **Considerable uncertainties in measured costs**

# Figure 2. Flow chart of identification, screening, and eligibility of studies: Newborn & Post-Partum Care, Nutrition & Infant Feeding, Under-Five Illness & Maternal Care & Interpersonal Violence (Levin & Brouwer 2014)



**Table 5: Severe Acute Malnutrition Care Costs  
(USD 2010) (Levin & Brouwer, 2014, Table 16)**

Severe Acute Malnutrition	Country	Per Child Treated	Per Child Recovered
Community-based management (Screening & Outpatient)[107]	Bangladesh	\$165.00	\$180.00
Community-based management (Outpatient)[100]	Malawi	\$214.34	
Community-based therapeutic care[84]	Zambia	\$310.06	
Community-based therapeutic care[83]	Ethiopia	\$217.77	
Inpatient Care Medicines[155]	India	\$4.97	
Malnutrition program (Daily Program)[78]	Indonesia	\$455.08	
Malnutrition program (Weekly Program) [78]	Indonesia	\$401.37	
Inpatient Care Medicines[155]	India	\$4.97	
Inpatient Care[107]	Bangladesh	\$1,344.00	\$9,149.00
Therapeutic Feeding Center (>=21 days) [83]	Ethiopia	\$444.78	

# EXAMPLES OF BENEFIT-COST ESTIMATES

- **Nutritional interventions for children < 5 yrs old (Copenhagen Consensus 2004)**
- **Preschool program expansion for lower quintiles in the distribution of parental income based on 73 countries (*Lancet* 2011)**
- **Country-specific investments to reduce stunting in 17 high prevalence countries (*Maternal and Child Nutrition* 2013)**
- **Preschool program simulations in Uganda**



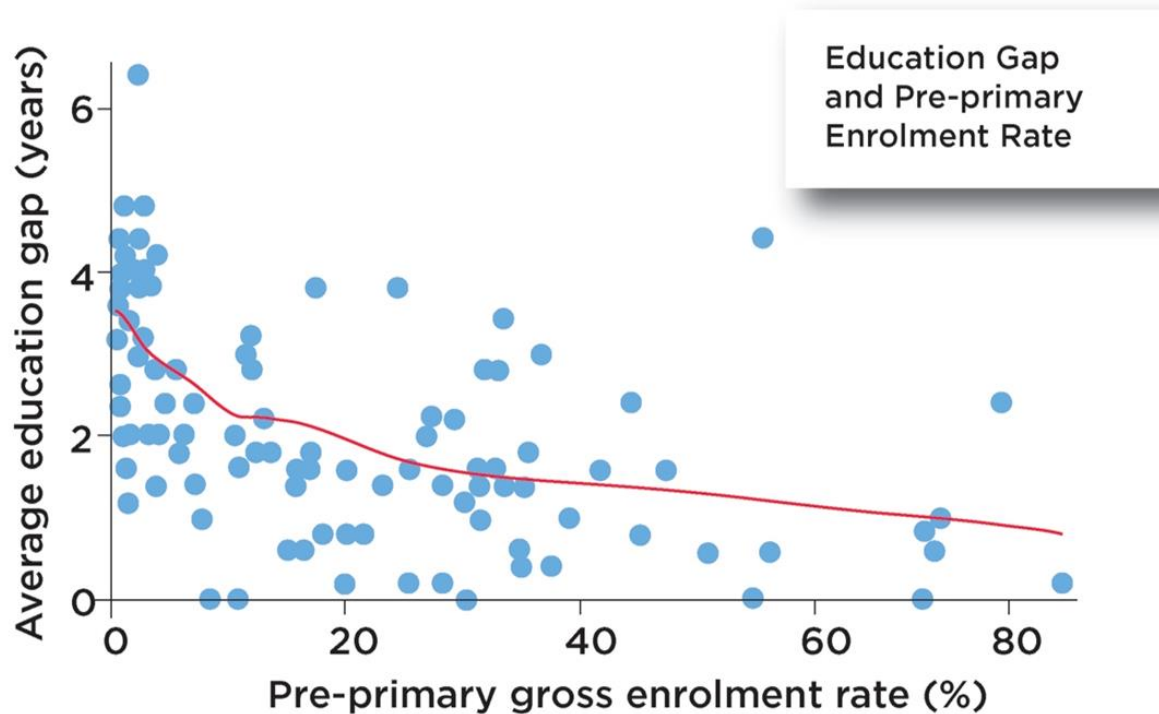
**Table 6. Benefit-Cost Estimates for Nutritional Interventions for Children < 5 yr of age, discount rates of 3-5% (Copenhagen Consensus, Behrman et al.)**

	Benefit/ Cost Ratio
1. Reducing LBW for pregnancies with high probabilities LBW	
1a. Treatments for women with asymptomatic bacterial infections	0.58-4.93
1b. Treatment for women with presumptive STD	1.26-10.71
1c. Drugs for pregnant women with poor obstetric history	4.14-35.20
2. Improving infant and child nutrition in populations with high prevalence of child malnutrition	
2a. Breastfeeding promotion in hospitals in which norm has been promotion of use of infant formula	5.6-67.1
2b. Integrated child care programs	9.4-16.2
2c. Intensive pre-school program with considerable nutrition for poor families	1.4-2.9
3. Reducing micro nutrient deficiencies	
3a. Iodine (per woman of child bearing age)	15-520
3b Vitamin A (pre child under six years)	4.3-43
3c Iron (pregnant women)	6.1-14
Source: Constructed by author based on Behrman, Alderman and Hoddinott (2004)	

# Closing Gaps in Pre-School Enrollments (Engle, Fernald, Alderman, Behrman, et al. *Lancet* 2011)

- Used data from 73 countries to estimate long-term effects of one type of ECD intervention – preschool.
- Countries with higher preschool enrolment have smaller gap in attained schooling between highest income quintile and other quintiles

# Preschool's lasting positive effects



*Association of preschool enrolment and the schooling gap for 73 low-income and middle-income countries. Schooling gap defined as the gap between schooling attainment of the wealthiest quintile of youth compared with youth in other wealth quintiles. Average education gap is for those aged 15-19 years. Pre-primary gross enrolment rate is from 8-12 years earlier. Bandwidth=0.8.*

- Increasing preschool enrolment benefits attained schooling
- Estimated increase in future earnings US \$11 - 34 billion
- Benefit-to-cost ratio from 6.4 to 17:1, depending on % preschool children enrolled (25% - 50%)
- Conservative estimate – only impacts as captured by preschooling-schooling-earning nexus

**Table 8. Benefit-Cost Ratios for Moving Child from Stunting at 24 months to not-Stunted in 17 Selected Heavily-Burdened Countries (Hoddinott et al. 2013)**

Region	Country	Income Benefit/ Budgetary Cost from Hoddinott et al. (2013a)	Adjusted Benefit-to- Cost Ratio <sup>a</sup>
Sub-Saharan Africa	Democratic Republic of Congo	3.5	2.4
	Madagascar	9.8	6.8
	Ethiopia	10.6	7.3
	Uganda	13	9.0
	Tanzania	14.6	10.1
	Kenya	15.2	10.5
	Sudan	23	15.9
	Nigeria	24.4	16.9
Middle East and North Africa	Yemen	28.6	19.8
South Asia	Nepal	12.9	8.9
	Burma	17.2	11.9
	Bangladesh	17.9	12.4
East Asia	Pakistan	28.9	20.0
	India	38.6	26.8
	Vietnam	35.3	24.5
	Philippines	43.8	30.4
	Indonesia	47.7	33.1

Source: Constructed by authors based on Hoddinott et al. (2013) estimates with Bhutta et al. (2013) cost and intervention data.

<sup>a</sup>Adjustments include increasing benefits by 20% to represent non-income/consumption benefits and increasing costs by 50% to represent private costs and by 25% to represent distortion costs.

# Table 9. Ugandan Pre-School Benefit-Cost Estimates (Behrman-van Ravens 2013)

Base Case	Base Case Except					Base Case with All Changes in Previous Five Columns	Higher Discount Rate	
	Higher Preschool Impact on Schooling	Higher Rate of Return to Schooling Attainment	Lower Costs	Lower Discount Rate	Higher Positive Externalities		Base Case Except Discount Rate=10%	Case in Column (7) Except Discount Rate = 10%
1.6	1.8	2.7	2.6	2.6	1.9	8.6	1.1	3.6

# CONCLUSIONS

- **Apparently high benefit-cost ratios (though considerable uncertainty, heterogeneity)**
- **Mostly for poor; if rights weighed heavily, probably higher**
- **Not guidance on efficiency/productivity motive**
- **Context specific (Colombia, SABER)**

# J-PAL/MIT Website

## Extra Years of Education per \$100 Spent

Evaluations	Cost-Effectiveness	Impact: 90% Confidence Interval		
		Lower Bound	Point Estimate*	Upper Bound
<b>Programs</b>				
<b>1 Information in Madagascar</b> Giving parents information on the higher wage returns to education caused higher student attendance.	19.8 years	0.19	3.517	6.84
<b>2 Deworming in Kenya</b> Deworming children at school decreased absenteeism by 25% and was extremely cost-effective.	6.1 years	4.59	11.25	17.91
<b>3 Iron &amp; Deworming in India</b> Children were given iron supplements and deworming pills to fight anemia, enabling them to attend school more often.	2.9 years	0.21	5.8	11.39
<b>4 Merit Scholarships in Kenya</b> Merit scholarships for high-performing girls induced all students to attend more regularly.	0.27 years	0.24	3.20	6.16
<b>5 Free School Uniforms in Kenya</b> Subsidizing uniforms, a large part of school expenses, increased student attendance.	0.72 years	2.95	6.40	9.85
<b>6 CCT for Primary Enrollment in Mexico</b> Families were given cash transfers conditional upon their children attending primary school.	0.032 years	0.77	1.23	1.68

\*Point estimate of the percentage point increase in enrollment/attendance

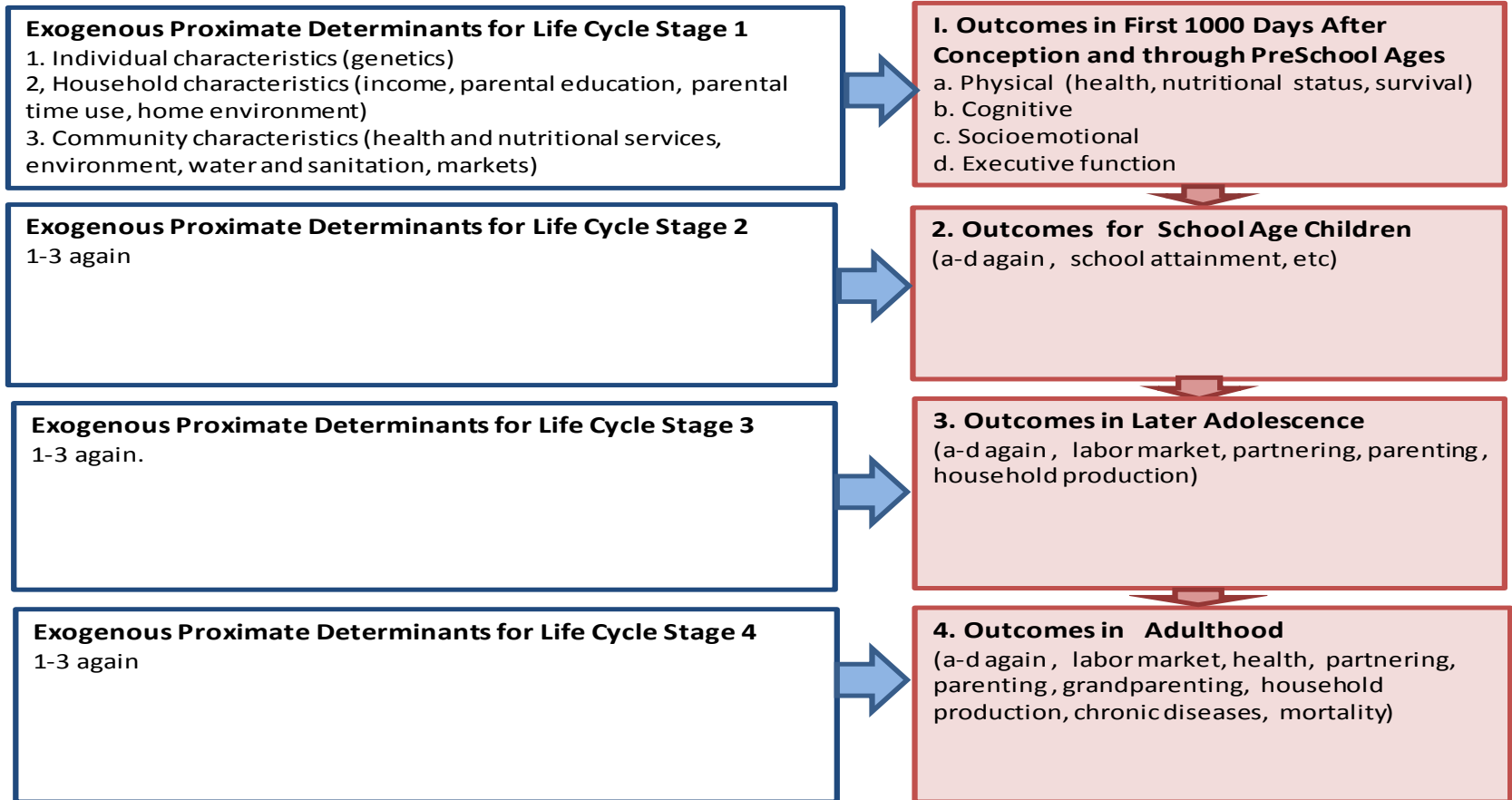


Guess for which country interventions to increase primary schooling in the last decade are likely to be least effective?

<b>Country</b>	<b>Net Primary School Enrollments in 2000</b>
Madagascar	68%
Kenya	65%
India	79%
Mexico	97%

# Extra Slides

# Figure 1. Child Developmental Outcomes within a Life Cycle Framework



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	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Assumptions</b>									
Impact of Preschool on Schooling Attainment (Grades)	2.6	3.8	2.6	2.6	2.6	2.6	3.8	2.6	3.8
Rate of Return to Increased Schooling Attainment (%)	7.5%	7.5%	11.5%	7.5%	7.5%	7.5%	11.5%	7.5%	11.5%
Direct Cost of Year of Preschool (% of Basic Wage)	10.0%	10.0%	10.0%	5.0%	10.0%	10.0%	5.0%	10.0%	5.0%
Direct Cost of Additional Grade of School (% of Basic Wage)	15.0%	15.0%	15.0%	10.0%	15.0%	15.0%	10.0%	15.0%	10.0%
Opportunity Cost of Additional Year of School (% of Basic Wage)	75.0%	75.0%	75.0%	50.0%	75.0%	75.0%	50.0%	75.0%	50.0%
Discount Rate (%)	6.0%	6.0%	6.0%	6.0%	3.0%	6.0%	3.0%	10.0%	10.0%
Externality as % of Labor Market Rate of Return	10.0%	10.0%	10.0%	10.0%	10.0%	25.0%	25.0%	10.0%	25.0%
<b>Benefit-Cost Ratio</b>	<b>1.6</b>	<b>1.8</b>	<b>2.7</b>	<b>2.6</b>	<b>2.6</b>	<b>1.9</b>	<b>8.6</b>	<b>1.1</b>	<b>3.6</b>