# Scaling Up School Readiness: Experimental Evidence from The Gambia

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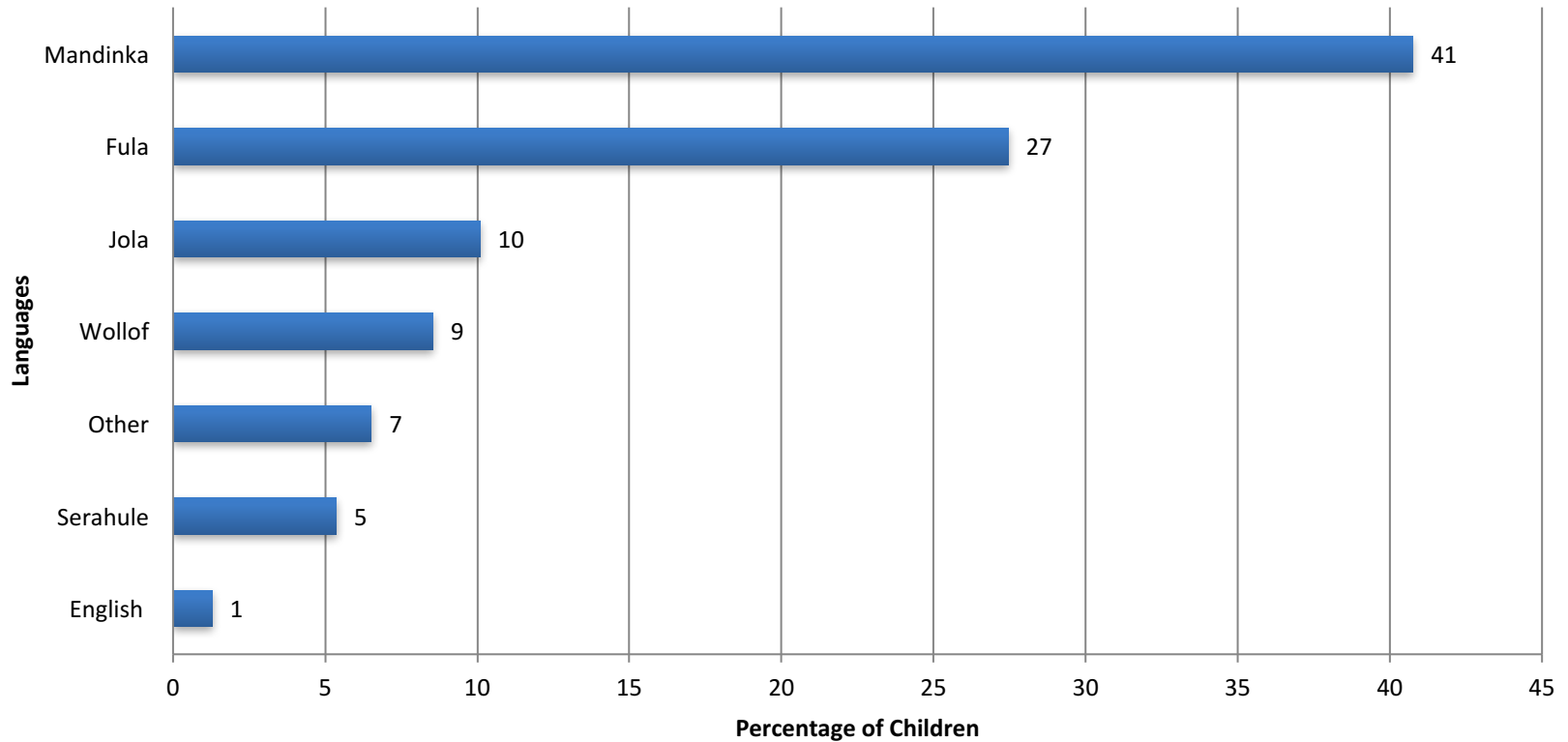Todd Pugatch (Oregon State University, IZA)

# Little early contact with the instructional language



**Language Spoken at Home**

| Languages | Percentage of Children |
|-----------|------------------------|
| Mandinka | 41 |
| Fula | 27 |
| Jola | 10 |
| Wollof | 9 |
| Other | 7 |
| Serahule | 5 |
| English | 1 |

# Possible solutions

1. **Use mother tongue language for early instruction**

   ❑ But there are many and often none spoken by all

   ❑ Ethnic politics and nation building consideration

   ❑ Does not address other component of school readiness

**2. Create a affordable ECD and school readiness program targeting both access and quality**

# School readiness and ECD access in The Gambia at baseline

1. **Annex ECD**
   - ❑A facility attached to selected primary schools
   - ❑Little to no tuition charges
2. **Private ECD**
   - ❑Charges much higher tuition
   - ❑Often in urban areas
3. **Community level provision (often NGOs driven)**

About 22% of children attend some form ECD program

# Objective:

❑ Institutionalize an ECD program as integral part of the primary school system.

❑ Emphasizing cognitive stimulation

❑ Developed a comprehensive curriculum called GOALS

# Question:

❑ Which approach should be scaled up? – Community-based or Annexes to Schools?

- ✓ Two years to answer the question
- ✓ Will build community base ECD centers for the purpose of the study but no new ECD annex.

# Methodology

1. **Two experiments to deliver new curriculum based on structured play for children ages 3-6**

   i. **Community-based ECD experiment**
      - Construction of new facilities in randomly selected villages without access to structured ECD services
      - Hiring and intensive training of facilitators on the newly developed curriculum

   ii. **ECD Annex experiment**
      - intensive training for providers in existing ECD annexes (about half of the existing annexes)
      - The other half received the curriculum with all the guidance needed but not the intensive training

2. **Cross experiment comparison using matching on observables**

3. **Qualitative evidence on the implementation and the curriculum delivery**

# Growing literature & debates

❑ **Developed countries: ECD programs most effective**…
   (Heckman & Mosso 2014, Elango et al 2015)
   ❑ …when program quality high
   ❑ …for disadvantaged children

❑ **Developing countries**
   ❑ Provider training RCTs: Jamaica (Baker-Henningham et al 2012), Chile (Yoshikawa et al 2015), Malawi (Ozler et al 2016), Ghana (Wolf et al 2017)
   ❑ Program expansion RCTs: Mozambique (Martinez et al 2013), Cambodia (Bouguen et al 2014)
   ❑ Contribute to broader lit on program implementation in developing countries (e.g., Bold et al 2013)

❑ Developing countries: lit on pre-school (age 3-6) interventions relatively thin on…
   ❑ Sub-Saharan Africa
   ❑ program quality

# Experimental design

❑ **The curriculum: Gambia Open and Active Learning Spaces (GOALS )**
   ❑ Cognitive stimulation through structured play
   ❑ Curriculum introduced for ages 3-6
   ❑ 4 hours/day, 40 weeks/year
   ❑ Monthly community/parent meetings
❑ **Training**
   ❑    3 trainings (5/5/8 days)
   ❑    A unit setup within the ministry to monitor and support throughout
   ❑    Contracted by international NGOs, financed by Government, WB, and JSF

❑ Sample: ECD Annex treatment: intensive provider training
   ❑ Sites: 26 treatment, 27 control
   ❑ Sites: 40 treatment, 50 control

# Experiment: Data

❑ **Baseline/endline: caregiver surveys, child development assessments**

    ❑ Sample: 16 HHs per community

        ❑ Assessments administered to subset of eligible children

❑ **Malawi Development Assessment Tool (MDAT)**

    ❑ Fine motor skills module: Stacking blocks, placing pegs in board, determining relative weights, etc.

    ❑ Language and hearing module: Names of body parts, uses of objects, letters in name, etc.

❑ **Binary item scoring**

    ❑ Total score converted to age- and gender-adjusted z-score

# MDAT: Fine motor skills

## MDAT FINE MOTOR 36-59 MONTHS:  ITEMS 18-41

| | | | | |
|---|---|---|---|---|
| 23. USE 12 blocks. Make tower of 6 **BLOCKS** and then put 6 blocks in front of child and say "Make a tower just like mine." Allow 2 trials.<br><br>YES.....................1<br><br>NO..........................0 | 22. Child can stack 4 blocks. **SCORE FROM ITEM 23**<br><br>YES.....................1<br><br>NO..........................0 | 20.  Child can stack 2 blocks. **SCORE FROM ITEM 23**<br><br>YES.....................1<br><br>NO..........................0 | 30. USE 6 BLOCKS. Child can make bridge of 3 blocks<br><br>YES.....................1<br><br>NO..........................0 | 35. USE 12 BLOCKS. Child can make bridge of 6 blocks<br><br>YES.....................1<br><br>NO..........................0 |
| 36. USE 12 BLOCKS. Child can make stairs with 6 blocks<br><br>YES.....................1<br><br>NO..........................0 | 24. Show child how fingers go into peg holes. Put in 2 pegs, explaining what you are doing. Remove pegs and ask child to put them all in. Child puts pegs into board in up <= 30 secs.<br><br>YES................1<br><br>NO..................0 | 21. Child puts pegs into board in up to 2 minutes **SCORE FROM ITEM 24**<br><br>YES................1<br><br>NO..................0 | 25. Screws and unscrews lid on jar (after demonstration).<br><br>YES.....................1<br><br>NO..........................0 | 26. Threads 6 beads (demonstrate with 2 beads).<br><br>YES.....................1<br><br>NO..........................0 |
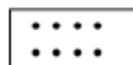
# MDAT: Language and hearing

| MDAT LANGUAGE AND HEARING 36-59 MONTHS: ITEMS 16-43 | | | | |
|---|---|---|---|---|
| 20. MARK 'YES' IF CHILD HAS TOLD YOU HIS/HER NAME. If not, ask child to tell you his or her first name.<br><br>YES.................1<br><br>NO....................0 | 18. Ask child to point to **eyes, ears, nose, mouth, hands**. SCORE YES IF CHILD POINTS TO >=2 PARTS.<br><br>YES.................1<br><br>NO....................0 | 23. Remove **12 objects**. Touch or point to each object, saying "Tell me what this is," or "What is this called?" Mark YES if child can **NAME** 10 objects<br><br>YES.................1<br><br>NO....................0 | 19. Child can **NAME 5** objects in the basket. **SCORE FROM THE ADMINISTRATION OF 23.**<br><br>YES.................1<br><br>NO....................0 | 22. With the **12 objects out**, ask child, "Where's the ____?" DO NOT point, touch or look at the objects. Score YES if child can **IDENTIFY** 10 objects.<br><br>YES.................1<br><br>NO....................0 |
| 16. Child can **IDENTIFY** (point to or give you) **5 or more** objects you name. **SCORE FROM THE ADMINISTRATION OF 22.**<br><br>YES.................1<br><br>NO....................0 | 21. **USE cup, pencil, matchbox, car. Without gesturing, ask** "Which one is for drinking?" "Which one is for writing?" "Which one is for lighting fire?" "Which one is for driving?" Score YES if child knows **3 or more**.<br><br>YES.................1<br><br>NO....................0 | 26. USE **bicycle, spoon, broom, bottle. Without naming, POINT** to each object and say, "What do you do with THIS?" Score YES if child correctly uses action words (verbs) for **3 or more**.<br><br>YES.................1<br><br>NO....................0 | 24. Say, "Tell me 3 foods you like to eat." Be sure to prompt if child says "tea." Ask for 3 animals if child says 2 or fewer foods. Score YES if >=3 foods OR animals.<br><br>YES.................1<br><br>NO....................0 | 28. Say, "What do you do when you are. . .hungry/tired/ cold?" Score YES if child can answer 2 of 3.<br><br>YES.................1<br><br>NO....................0 |
| 29. Say, "Which goes faster, a car or a bicycle?" Score YES if child says car.<br><br>YES.................1<br><br>NO....................0 | 30. Tell child, "Repeat what I say. Say 'Pa.' Say 'Pa-Chi.' Say 'Pa-Chi-Tu.' Say 'Pa-Chi-Tu-Go.'" Score YES if child repeats all stages correctly.<br><br>YES.................1<br><br>NO....................0 | 25. Say, "Listen carefully to me and do EXACTLY what I say. Ready? OK. I want you to stand up, then clap your hands and then turn around."<br><br>YES.................1<br><br>NO....................0 | 31. Use cup and counter. Ask child to put counter on top of, under, next to, in front of and behind cup. Must do 3.<br><br>YES.................1<br><br>NO....................0 | 32. OPPOSITES. "I want you to help me finish some sentences. If a boy is small, a man is... If the sun comes up in the day, the moon comes up ... A baby is young, and a grandma is old. Brothers and fathers are boys, mothers and sisters are girls. You cry when you are sad, but you smile when you are happy. Score YES if **2 or more of these**.<br><br>YES.................1<br><br>NO....................0 |

MDAT scores

Community-based ECD experiment
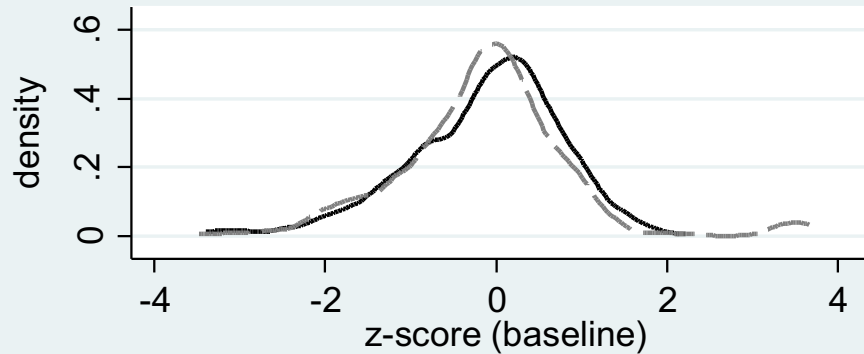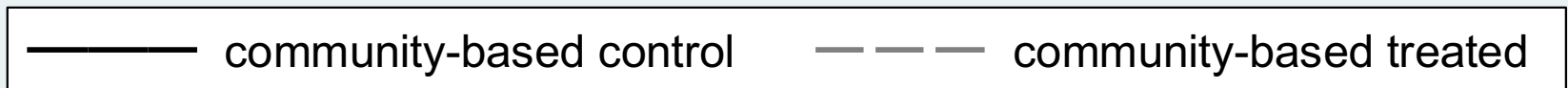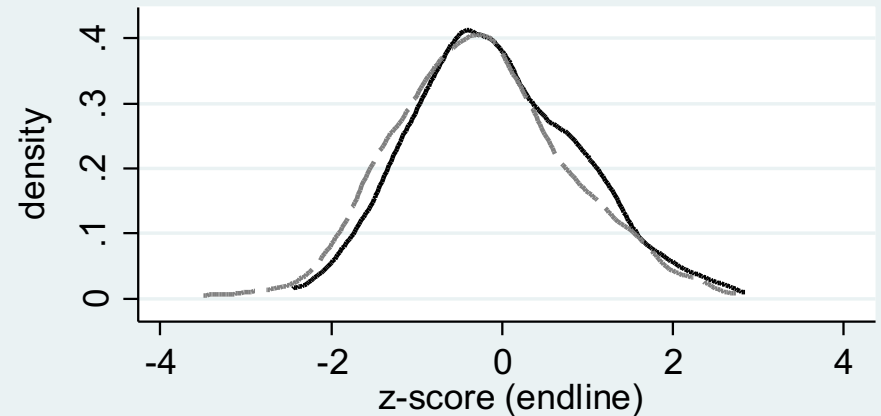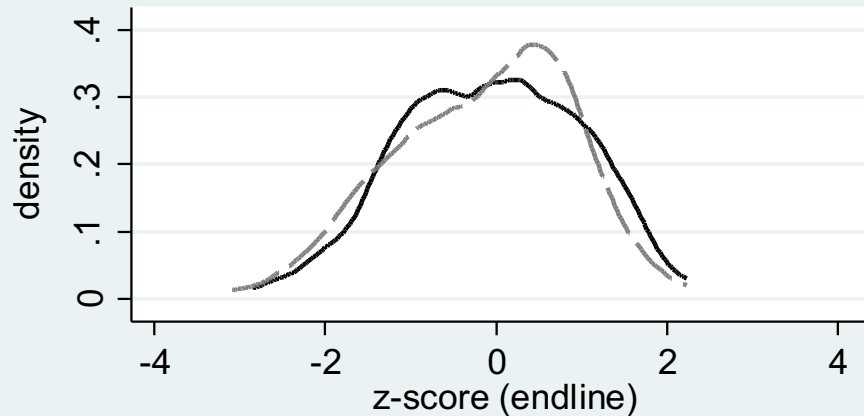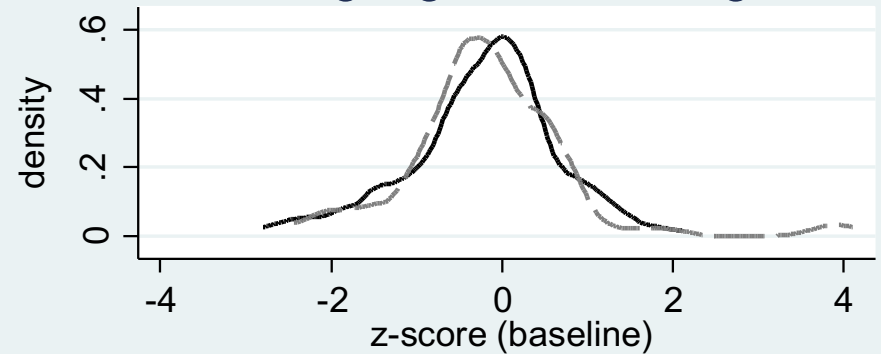
Scores adjusted by age, age squared, and gender.

MDAT scores

ECD Annex experiment
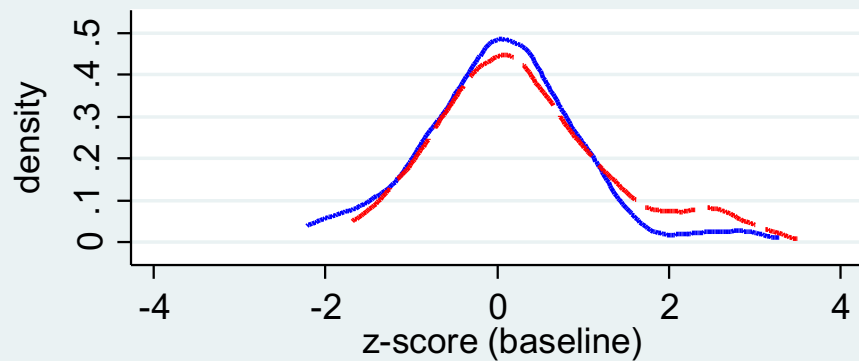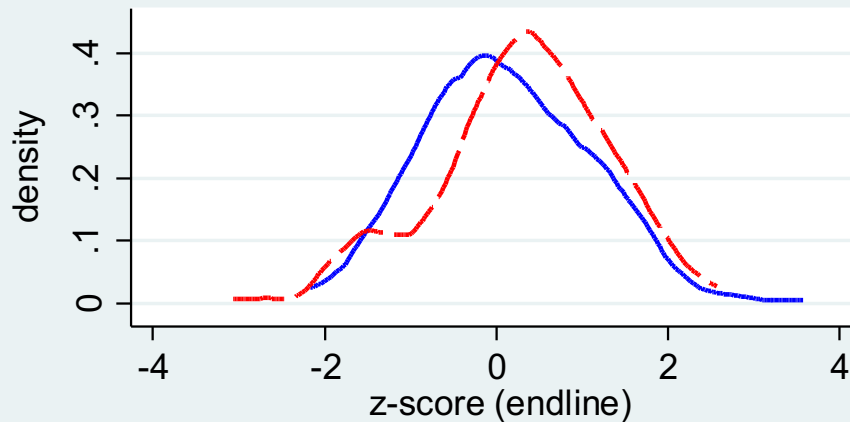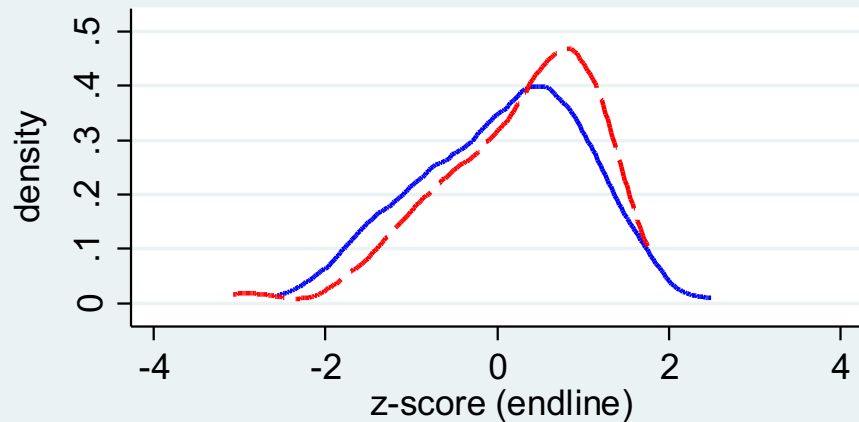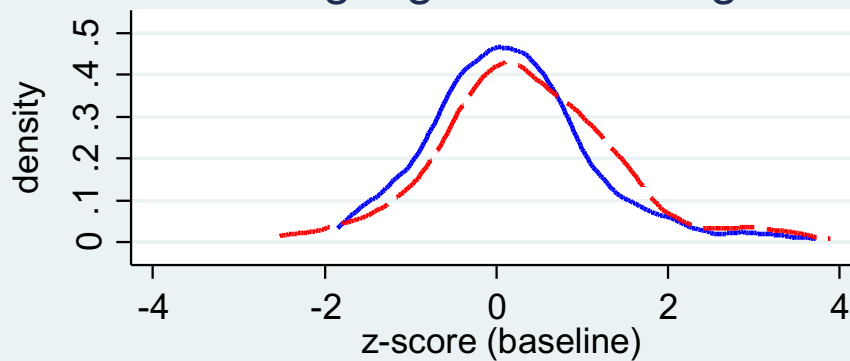
Scores adjusted by age, age squared, and gender.

# Conclusion 1

❑ No evidence of child development impact attributable to GOALS through either that community-based ECD construction or Annex ECDs.

❑ Some interesting treatment effect heterogeneity:

  ❑ Annex good for poor & community-based not good for well-off

   ❑ Consistent with existing literature on concentration of benefits for disadvantaged children

   ❑ Interpretation: substitutability between parental and public investments in young children

# Between-experiment comparison

- Propensity score estimation
  - Logit of ECD Annex experiment indicator on baseline characteristics:
    - MDAT scores
    - Female
    - Age (months)
    - Region
    - ECD attendance
    - Height-for-age
    - Vaccinations (% of 17 recommended)
    - Household size, expenditure, ECD demand
    - Mother schooling, mental health
- 77% of observations remain after trimming for common support

# Between-experiment balance

| | community-based (1) | ECD Annex (2) | (1) vs. (2) (3) | p-value (4) |
|---|---|---|---|---|
| Language and hearing | | | | |
| overall score (z) | 0.33 | 0.09 | -0.24 | 0.30 |
| | (0.20) | (0.11) | (0.23) | |
| knows own name | 0.18 | 0.17 | -0.01 | 0.87 |
| & its letters (% of 4) | (0.04) | (0.01) | (0.04) | |
| speaks in clear sentences | 0.92 | 0.95 | 0.03 | 0.36 |
| | (0.03) | (0.02) | (0.03) | |
| counting (% of 3) | 0.23 | 0.19 | -0.03 | 0.55 |
| | (0.05) | (0.02) | (0.06) | |
| name colors (% of 4) | 0.13 | 0.07 | -0.07 | 0.15 |
| | (0.04) | (0.01) | (0.05) | |
| Fine motor skills | | | | |
| overall score (z) | 0.26 | 0.03 | -0.23 | 0.33 |
| | (0.22) | (0.11) | (0.24) | |
| play with blocks (% of 6) | 0.41 | 0.36 | -0.05 | 0.16 |
| | (0.03) | (0.02) | (0.04) | |
| draw lines & shapes (% of 6) | 0.44 | 0.39 | -0.05 | 0.28 |
| | (0.04) | (0.02) | (0.05) | |
| order rows of items (% of 2) | 0.13 | 0.11 | -0.02 | 0.67 |
| | (0.06) | (0.02) | (0.06) | |
| Observations | | | | |
| children | 328 | 320 | | |
| sites | 55 | 50 | | |

All variables are means from baseline survey. Drops observations outside common support of propensity score distribution. Columns (5)-(8) weighted by inverse propensity score where indicated. Standard errors in parentheses, clustered by settlement. p-values obtained from regression of characteristic on community-based treatment and Region 2 dummy in order to adjust for stratification by region. Fine motor, language and hearing skills are z-scores from MDAT. Adjusted scores are standardized residuals from regression of raw score on child's age, age squared, and female dummy. Other variables are subsets of items on MDAT test, measured as percent of items completed correctly. Speaks in clear sentences is just one item, while other categories have number of items indicat

# Between-experiment balance at baseline



Baseline Characteristics Socio-economic Characteristics
Annex attendees vs. Community-based
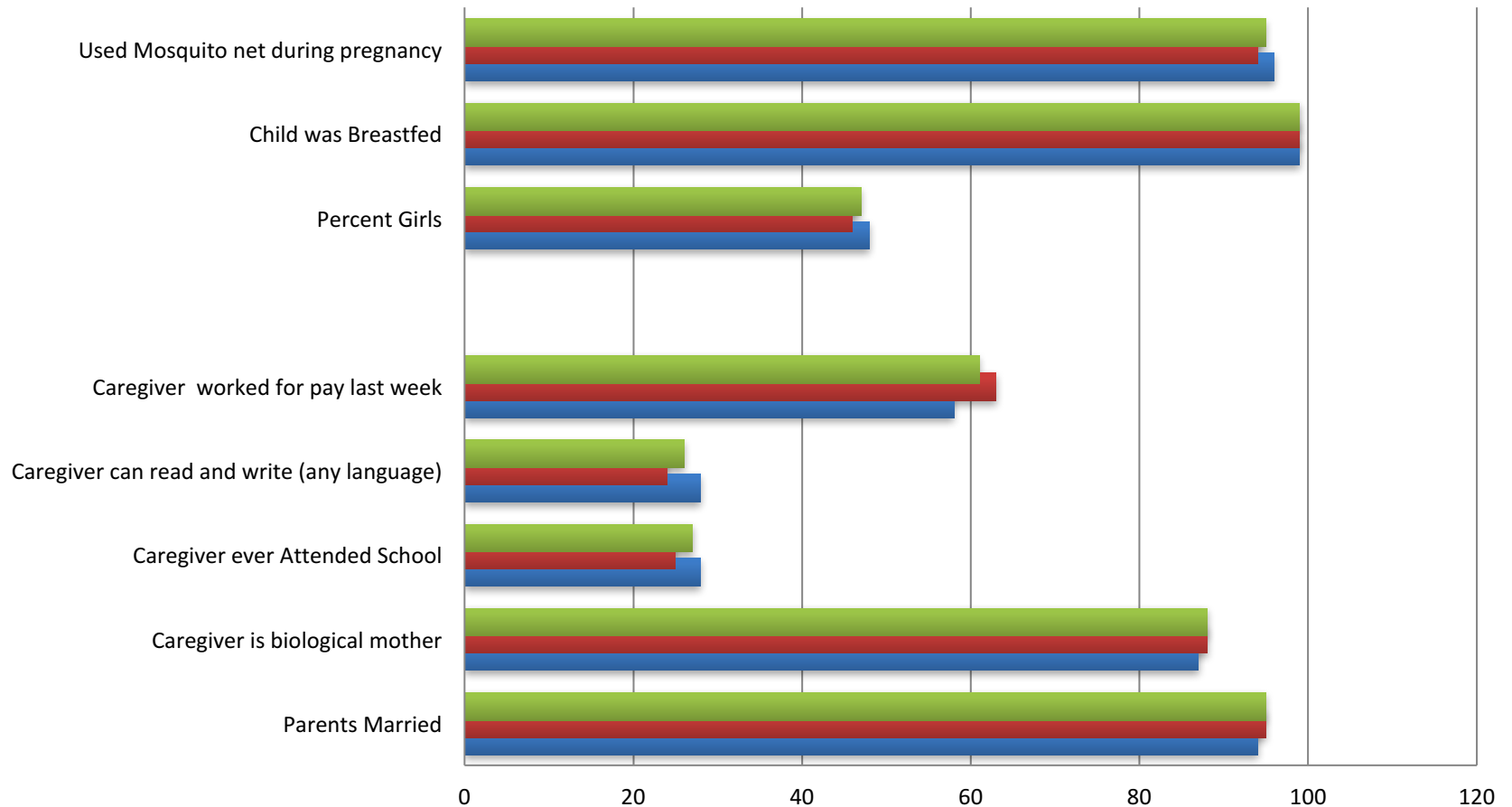
# Cross-experiment comparison

**Endline outcomes, combined experimental groups**

| MDAT module | Language and hearing | | | | Fine motor | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Includes baseline outcome | | x | | x | | x | | x |
| Difference from Community-based ECD | | | | | | | | |
| ECD Annex | 0.47*** | 0.40* | | | 0.39** | 0.34 | | |
| | (0.18) | (0.21) | | | (0.19) | (0.21) | | |
| | [0.22,0.74] | | | | [0.16,0.66] | | | |
| ECD Annex control | | | 0.49* | 0.49 | | | 0.42* | 0.40 |
| | | | (0.26) | (0.31) | | | (0.23) | (0.25) |
| | | | [0.15,0.74] | | | | [0.42,0.76] | |
| ECD Annex treatment | | | 0.45*** | 0.29* | | | 0.35* | 0.26 |
| | | | (0.17) | (0.17) | | | (0.19) | (0.19) |
| | | | [0.15,0.68] | | | | [0.11,0.58] | |

* significant at 10%, ** significant at 5%, *** significant at 1%. Pure control group (i.e., control group from community-based ECD experiment) is omitted category. All regressions include region 2 dummy to adjust for stratification of treatment assignment and weight by inverse propensity score. Sample drops observations outside common support of propensity score distribution. Standard errors in parentheses, clustered by settlement. Outcomes are adjusted z-scores from MDAT modules for language and hearing and fine motor skills. Adjusted scores are standardized residuals from regression of raw score on child's age, age squared, and female dummy. Regressions include baseline outcome where indicated. Differences with community-based ECD reported at bottom of table based on tests of indicated coefficient with community-based ECD. Lee bounds reported in brackets, based on pairwise comparison, but still reweighting by inverse propensity score and stratifying by region. Propensity score obtained from logit model of membership in ECD Annex sample regressed on baseline characteristics. Included baseline characteristics: age (exact based on DOB), female, Region 2, ECD attendance, fine motor skills (age-adjusted z-score), language and hearing (age-adjusted z-score), height-for-age, household size, mother's years of schooling, household expenditure per capita (winsorized at 1st/99th percentiles), willingness to pay for ECD as % of household expenditure per capita, % of vaccines received, mother mental distress (% of items reported as experiencing "most of the time"). Missing values imputed to zero, with dummies for imputed value included as additional covariates in regression.

# Conclusion 2

❑**Between-experiment comparison:**

    ❑ECD Annex more effective than community-based centers among observationally similar children

    ❑ECD Annex treatment no more effective than control

❑**Caveats:**

    ❑Short-term child development outcomes

    ❑Community-based ECD newly in operation

    ❑Newly developed curriculum

# Qualitative & Implementation Considerations

❑ Uptake – Higher with the community-based

❑ Staffing – Harder to fill with the community-based

❑ Management: Quality insurance and monitoring system – Exists already for annexes but need a new structure for the community-based

❑ Enabling environment and peer effects – more likely with annexes for both children and teachers

# So, which model to proceed with?

❑Cautiously recommended the ECD annexes

❑New annexes are currently under way and will be rolled out to all schools over time

❑During the rollout, community based will be refined – some of implementation issues resolved.