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Ghana Early Childhood Development

Learning Report

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The Maternal and Child Survival Program (MCSP) is a global, $560 million, 5-year cooperative agreement funded by the United States Agency for International Development (USAID) to introduce and support scale-up of high-impact health interventions among USAID's 25 maternal and child health priority countries, as well as other countries. MCSP is focused on ensuring that all women, newborns and children most in need have equitable access to quality health care services to save lives. MCSP supports programming in maternal, newborn and child health, immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment.

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Abbreviations

CHO	community health officer
CHPS	Community-Based Health Planning and Services
CHV	community health volunteer
CREDI	Caregiver Reported Early Development Instruments
CWC	child welfare clinic
ECD	early childhood development
FGD	focus group discussion
FHD	Family Health Division
GHS	Ghana Health Service
MCSP	Maternal and Child Survival Program
MTMSG	mother-to-mother support group
PY	program year
SWO	social welfare officer
USAID	US Agency for International Development

Executive Summary

Introduction

The Ghana Early Childhood Development (ECD) 0–3 activity was launched in December 2016 as a subcomponent of the US Agency for International Development (USAID)-supported Maternal and Child Survival Program (MCSP). The primary focus of the MCSP Ghana ECD program was to support the integration of ECD interventions into existing health and nutrition activities in Ghana. The program implemented activities through the Community-Based Health Planning and Services (CHPS), building upon MCSP's existing engagement focused on capacity-building of CHPS health workers for improved health outcomes. The aim of the ECD program was to engage parents and caregivers in stimulation and responsive parenting, in which caregivers respond to their children's physical and emotional needs from birth onward by responding to children's cues, playing, talking, singing, and providing exposure to words and numbers, even before children can talk. MCSP was careful to promote integration of ECD into daily routines to promote frequent, developmentally appropriate interactions between a caregiver and child.

The objectives of this assessment were to:

1. Monitor changes in CHPS staff knowledge on psychosocial stimulation practices.
2. Understand perspectives about the ECD activities from community health officers (CHOs), community health volunteers (CHVs), and caregivers who were engaged in the initiative.
3. Monitor changes in caregivers' behavior and child development outcomes for those participating in the MCSP Ghana ECD program.

Methods

This study used a longitudinal, mixed-methods approach to document changes in perceptions and practices around psychosocial stimulation and responsive care in communities implementing the MCSP Ghana ECD program in Upper West and Eastern regions. The study focused on three key stakeholder groups: frontline health workers (i.e., CHOs, CHVs, and other CHPS staff), social welfare officers, caregivers of young children, and children 0–3 years old. Tools used and samples obtained are described in detail in the following sections. The study protocol was approved by the John Hopkins University Internal Review Board and the Ghana Health Service Ethics Review Committee.

Results

Health Workers

Results from assessments of health worker knowledge of early stimulation before and after participating in the MCSP Ghana ECD trainings in program year 1 (PY1) and PY2[1] showed significant gains in short-term knowledge transfer for both implementing regions (Upper West and Eastern). In addition, MCSP collected data from PY1 health workers approximately 1 year after participation in the training to understand whether they retained the knowledge gained. The data revealed that the majority of health workers retained key competencies.

To support continued learning and improvement of CHPS staff in the area of ECD, MCSP conducted mentorship and supportive supervision visits to CHOs who facilitate parenting sessions. In addition to regular program monitoring, visits were conducted at 35 mother-to-mother support group (MTMSG) meetings and 15 child welfare clinics (CWCs). During the meetings, observers rated session facilitators' performance using the MCSP-developed observation checklist. In total, MCSP observed 50 CHOs during delivery of parenting sessions at MTMSGs and CWCs. By the end of PY2, these 50 CHOs received four observation visits. The data demonstrated that there was an improvement in CHOs' ability to integrate early stimulation into their activities and to effectively facilitate parenting sessions over time.

[1] PY1: December 2016–February 2018, PY2: March–December 2018, PY3: January–June 2019

In summary, quantitative and qualitative data found that health workers have been effectively delivering ECD content. This is an especially important finding given the cascade training approach used in this program. Results from assessments of health worker knowledge about psychosocial stimulation indicated that trainees gained and retained substantial knowledge from the MCSP Ghana ECD trainings. Observations of session delivery demonstrated strong adherence to the program design over time. Feedback from caregivers also suggests that they are satisfied with the facilitation techniques used by the health workers.

Caregivers

To document changes in caregiver behaviors and child development over time, MCSP deployed a caregiver survey, which included a detailed questionnaire about childcare practices and the short form of the Caregiver Reported Early Development Instruments (CREDI).2 Two subdistricts in Eastern Region and six subdistricts in Upper West Region were randomly selected for inclusion in the assessment. Within each subdistrict, 10 communities were randomly sampled, and 12 families per community were interviewed. In total, 253 caregiver-child dyads were interviewed both the pre- and post-test. On average, children in the sample were 21 months old (1.75 years), with girls comprising 52% of the sample.

Results from the caregiver questionnaire demonstrated significant increases in use of learning materials and play-based caregiving practices in both regions. Focus group discussion (FGD) data from health workers and caregivers also contained numerous references to positive changes in caregiving behaviors. Health workers and caregivers most commonly reported decreases in harsh discipline practices and increases in play. In addition, data suggested that caregivers received important health messages during the ECD sessions (e.g., handwashing, exclusive breastfeeding, sanitation, and malaria prevention). Data collected did not indicate substantial differences in caregiver behavior change related to region, suggesting that caregivers in rural and urban areas were benefiting from the MCSP Ghana ECD messages.

Children

Data from multiple sources also suggest that children have already benefited from improvements in caregiving practices and home environments. This assessment could not make causal inferences about impact of the program on children, but trends in quantitative and qualitative data suggest the MCSP Ghana ECD program is contributing to positive development for young children. CREDI data displayed significant improvements in overall child development in both regions over time. Caregivers in Upper West Region reported stronger child development compared to caregivers in Eastern Region at endline. In addition, multivariate regression analyses found that children whose caregivers reported engaging in more psychosocial stimulation and responsive care practices, those with more reading materials in the home, and those with greater dietary diversity displayed stronger overall development compared to children of caregivers who reported fewer of these nurturing caregiving practices.

Recommendations

The MCSP Ghana ECD approach aligns with the global movement toward integrated ECD services for young children as codified in the recently released Nurturing Care Framework. The quantitative and qualitative results from this assessment suggest that the MCSP Ghana ECD program successfully trained and built the capacity of 2,075 service providers in Upper West and Eastern regions to carry out early stimulation activities. This experience also generated important suggestions for future ECD work in Ghana. See below for select recommendations for the Government of Ghana, particularly the Ghana Health Service, and other ECD partners.

[2] CREDI has been piloted in 17 low-, middle-, and high-income countries. Results from these pilots suggest that the CREDI short form is valid and reliable for measuring children's skills and behaviors. CREDI is an open-source tool and consists of a caregiver report format that requires limited training and implementation time. The tool measures motor, cognitive, and socioemotional skills of children under 3 living in low-resource settings.

Platforms and Attendance

- It is important to continue using the approach of reaching parents through various entry points and platforms. The health sector provides the best promise for leadership of the integrated ECD programs for children ages 0–3 years, but no one entry point will be adequate for serving all children. Cross-sectoral collaboration and linkages with the Ministry of Gender, Children, and Social Protection and the Ghana Education Service will strengthen the impact of such programs, with a wide range of providers reinforcing key ECD messages from multiple sources. Parenting groups led by frontline health workers can be complemented by other efforts to reach parents through other outlets, such as church groups, home visits, or social media.

- To support continued attendance at parenting groups, providers must highlight the importance of engaging in early stimulation throughout the critical period of brain development (i.e., from birth to 3 years). This is particularly important for groups meeting during CWCs, as caregivers/children typically end frequent routine visits for growth monitoring at age 2 in Ghana.

- The MCSP Ghana ECD program used multiple implementation platforms for program delivery and sensitization, including MTMSGs, CWCs, home visits, religious fellowship groups, community meetings (*durbars*), parent-teacher association meetings, and counseling during antenatal care visits. In future programming, MCSP recommends each community select one implementation platform for full session delivery and at least one more for sensitization.

Behavior Change

- Quantitative and qualitative data suggest that the program made substantial contributions to behavior change for caregivers of young children in urban and rural areas of Ghana. However, global research demonstrates that behavior change takes time and reinforcement. For example, the most common behavior change reported during FGDs was a decrease in harsh discipline. While this represents a substantial improvement in the environments within which children are developing, it suggests that perhaps some of the nuanced messages about different kinds of play and stimulation activities were not yet internalized by caregivers. Continued focus on these messages will be necessary to fully achieve the desired outcomes of ECD programs. ECD programs should be designed and implemented as ongoing, similar to the continuous health services received by young children.

Training

- Future trainings should carefully consider the roles of CHPS staff and CHVs within target communities. Different cadres of frontline workers may be more appropriate to lead program delivery in different communities due to language barriers and other factors. Collaboration between these groups is often needed to fully support implementation activities.

- Future program implementation should also support training for supervisors within the CHPS system to help maintain quality of psychosocial stimulation message delivery. This includes training via the MCSP-created ECD 0–3 eLearning modules.

Engaging Male Caregivers

- Male caregivers should be specifically targeted in future programming. If male participation is low in group settings, finding other ways to reach fathers will be important (e.g., with home visits or through social media outlets). Male participation and contribution are critical for improving their interactions with children and facilitating mothers' attendance at sessions and behavior change in the home. Future programs could include mass sensitization and campaigns geared at changing attitudes of fathers.

Research and Evidence

- Future programs should incorporate causal research to better understand the impact of integrated ECD programs on children's development in Ghana. This research could focus on questions of dosage and duration of ECD activities—how much input is needed to make significant improvements in caregiving behaviors and child development? To implement a high-quality research design, these activities should be planned and budgeted from the start of the program implementation.

- Strong ongoing monitoring data should also be incorporated into future work, especially programs focused on scaling up of services, to help ensure quality.

Introduction

The Maternal and Child Survival Program (MCSP) Ghana Early Childhood Development (ECD) 0–3 program aimed to promote psychosocial stimulation and responsive parenting at the community level via frontline health workers to increase caregiver knowledge and practice of psychosocial stimulation activities. The program integrated early learning and responsive caregiving activities into existing health and nutrition activities for a more holistic approach, aligned with the Nurturing Care Framework. In alignment with *Advancing Protection and Care for Children in Adversity: A U.S. Government Strategy for Foreign Assistance* and its first objective to build strong beginnings, MCSP targeted and supported critical periods in development, with efforts to reach populations who are chronically underserved. MCSP and the Government of Ghana, particularly the Ghana Health Service (GHS) Family Health Division (FHD), institutionalized ECD within the health sector by utilizing lessons learned to integrate ECD messaging into national guidelines, such as the National ECD 0–3 Standards and National Newborn Strategy. Further, MCSP played a central coordinating role, linking with institutions beyond the health sector, including social protection, to lay the foundations for a society in which children survive and thrive.

MCSP ECD Program in Ghana

The MCSP Ghana ECD 0–3 program was launched in December 2016. The primary focus of the MCSP Ghana ECD program was to support the integration of ECD interventions into existing health and nutrition activities in Ghana. The program implemented activities through the Community-Based Health Planning and Services (CHPS), building upon MCSP's existing activities focused on capacity-building of CHPS health workers for improved health outcomes. In alignment with other CHPS programs, community health officers (CHOs) were the lead implementers of the MCSP Ghana ECD program, and these staff trained and engaged the community health volunteers (CHVs) working in their communities. The aim of the MCSP Ghana ECD program was to engage parents and caregivers in stimulation and responsive parenting, in which caregivers respond to their children's physical and emotional needs from birth onward by responding to children's cues, playing, talking, singing, and providing exposure to words and numbers, even before children can talk. MCSP was careful to promote integration of ECD into daily routines to promote frequent, developmentally appropriate interactions between a caregiver and child.

Through the life of the project, the MCSP Ghana ECD program worked throughout Upper West, Upper East, Central, and Eastern regions. In program year 1 (PY1),[3] MCSP initiated support to integrate ECD into health and nutrition activities of CHOs and CHVs in three districts across Upper West and Eastern regions, covering six districts in total. In PY2, MCSP continued to support these six districts and expanded to 11 additional districts (i.e., eight districts in Upper West and three districts in Eastern) for a total of 17 districts out of 33, and expanded training to social welfare officers (SWOs) under the Ministry of Gender, Children, and Social Protection. In PY3, MCSP expanded to Upper East and Central region, and implemented activities in two districts within each region.

The program was implemented through mother-to-mother support groups (MTMSGs),[4] child welfare clinics (CWCs),[5] home visits,[6] and sensitization meetings. This report focuses on the group sessions provided for families with children ages 0–3 during PY1 and PY2 in Upper West and Eastern regions. Table 1 below shows the different ECD delivery platforms, frequency, time spent, and level of engagement. For more information about the strengths and limitation of different delivery mechanisms in Ghana, please see Appendix E in the End-of-Project Report.

[3] PY1: December 2016–February 2018, PY2: March–December 2018, PY3: January–June 2019
[4] MTMSGs are groups of mothers who meet at CHPS compounds for health-related information sessions.
[5] CWCs are a service provided at the CHPS compounds and health clinics comprising routine growth monitoring and vaccinations. Caregivers who attend CWCs are gathered in a group to share health information.
[6] Home visits are conducted by CHOs/CHVs twice a month. Home visits allow for sensitization, not full session review.

Table 1. Early childhood development (ECD) session implementation platforms

Platform	Description	Average frequency of meeting	Average length of a session	Level of Engagement (session or sensitization)
Mother-to-mother support group	Meeting for mothers who attend Community-Based Health Planning and Services (CHPS) compound services to learn more about health topics. ECD messages added on to health topics or presented every other meeting.	2 per month	45 minutes	Session
Child welfare clinic	Meeting of caregivers attending routine growth monitoring services. After wellness checks, caregivers receive ECD messages while reviewing child milestones in child health booklet.	1 per month	30 minutes	Session/sensitization
Home visit	Community health volunteers (CHVs)/social welfare officers (SWOs) visit homes to complete wellness checks and share health and ECD information. Using the MCSP Ghana ECD 0–3 brochure, key concepts and recommendations are covered. Caregivers keep brochures for reference.	8 per month	30 minutes	Sensitization
Religious fellowship groups	Group meetings held at religious institutions to discuss important community topics, including health information. With support from community health management committees, community health officers (CHOs) deliver ECD messages.	Weekly	120 minutes	Session/sensitization
Community meetings	Led and organized by community health management committees to provide updated health information to the public at large. Key ECD concepts and recommendations shared. Caregivers invited to attend full sessions where available.	1 per quarter	30 minutes	Sensitization
Parent-teacher association meetings	Parent-teacher meetings take place at daycares and schools to discuss relevant information on child development. CHOs/CHVs/SWOs attend to review key ECD concepts and invite caregivers to attend full ECD sessions.	1 per quarter	60 minutes	Sensitization
Antenatal care counseling	CHPS staff share developmental milestones and relevant ECD games to support early stimulation during routine antenatal care visits.	Daily	10 minutes	Sensitization

Methods

This study used a longitudinal, mixed-methods approach to document changes in perceptions and practices around psychosocial stimulation and responsive care in communities implementing the MCSP Ghana ECD program. The study focused on three key stakeholder groups: frontline health workers, including CHOs, CHVs, and other CHPS staff; SWOs; caregivers of young children; and children ages 0–3. Tools used and samples obtained are described in detail in the following sections.

The objectives of this assessment were to:

1. Monitor changes in CHPS staff knowledge on psychosocial stimulation practices.
2. Understand perspectives of the ECD program from CHOs, CHVs, and caregivers who were engaged in the program.
3. Monitor changes in caregivers' behaviors and child development outcomes for those participating in the MCSP Ghana ECD program.

This report summarizes the changes in knowledge and perception of psychosocial stimulation from frontline workers and caregivers, and the changes in caregiver's health and education practices and children's development over time.

Tools

Health Workers

The program utilized three tools to document changes in health workers' knowledge, attitudes, and practices around early stimulation:

1. Knowledge: A questionnaire was used to gather information about knowledge of psychosocial stimulation practices before and after the MCSP Ghana ECD training. The survey included 33 questions divided into two sections: early brain development and psychosocial stimulation for children at different ages. The questionnaire was anonymous and contained additional information related to the gender and cadre of the participants.
2. Practices: An observation checklist was used to monitor delivery of ECD messages during parenting sessions. The checklist included questions about materials, facilitation, and demonstration.
3. Attitudes: Focus group discussions (FGDs) were used to understand health workers' perceptions on the benefits and challenges of this new program in more depth. FGDs included approximately 10 discussion questions related to rollout of the program, perceived value of the initiative, and perceived changes in caregiving practices in target communities.

Caregivers and Children

The program employed three tools to document changes in caregivers' knowledge, attitudes, and practices around psychosocial stimulation and the relationship between caregiving practices and child development:

1. A multifaceted questionnaire was used to gather information about caregivers' practices with their children and other familial characteristics (see Table 2). Additional information about familial characteristics and nutrition practices was used to make more detailed predictions of factors related to caregiver behavior change and child development over time.
2. FGDs were used to understand caregivers' perceptions of the benefits and challenges of this new program in more depth. FGDs included approximately 10 discussion questions related to rollout of the program, perceived value of the initiative, and perceived changes in caregiving practices in for target communities.

3. The short form of Harvard University's Caregiver Reported Early Development Instruments (CREDI) was used to assess child development. This tool included 20 caregiver-reported questions about children's development in the areas of motor, cognitive, and socioemotional development, and created an overall score for children's developmental status. Separate forms were used for children 0–5 months, 6–11 months, 12–17 months, 18–23 months, 24–29 months, and 30–35 months. The assessment uses standardized and normed age-specific forms so that results for all children can be interpreted on one overall developmental scale.[7]

Table 2. Caregiver questionnaire

Section(s)	Description
1. General family information	Parental age, parental literacy, parental education, languages spoken at home, number of children at home
2. Breastfeeding and nutrition	Breastfeeding practices, child dietary diversity
3. Home learning environment	Types of reading materials at home, types of toys at home
4. Psychosocial stimulation and responsive care	Adults in the home engaging with children to promote psychosocial stimulation
5. Childcare and protection	Children left alone or in the care of another young child
6. Socioeconomic status	Housing materials, access to potable water, access to hygienic toilet, objects/appliances owned, land/animals owned

Sample

Health Workers

Knowledge

The sample of frontline health workers for the learning and knowledge retention was selected[8] from PY1 districts: three districts from Eastern Region and three districts from Upper West Region.[9] A total of 395 health workers were selected, 193 from Eastern and 202 from Upper West. For the retention assessment, the sample was selected from a cohort of CHOs who were part of the sample in PY1. A total of 92 CHOs were selected: 32 from Eastern Region and 60 from Upper West Region. MCSP and the GHS selected CHOs purposely from the cohort of PY1 health workers.

In PY2, MCSP took a sample of frontline health workers from three districts from Eastern Region and eight districts from Upper West Region (all new implementation districts under PY2). A total of 528 health workers participated in the knowledge assessment for PY2: 150 from Eastern and 378 from Upper West Region. Different cadres of health care workers participated in both phases: CHOs, community health nurses, and other cadres of health staff who were trained to lead ECD sessions in their respective CHPS zones/communities. MCSP selected participants in consultation with their respective district/municipal health directorates of the GHS.

Practices

Beginning in late PY1, MCSP conducted mentorship and supportive supervision visits with CHPS staff, who facilitated parenting sessions at 35 MTMSGs and 15 CWCs to support continued learning and improvement of CHPS staff in ECD. Overall, MCSP observed 50 CHPS staff during delivery of parenting sessions. By the end of PY2, these 50 CHPS staff received four observation visits.

[7] CREDI has been piloted in 17 low-, middle-, and high-income countries. Results from these pilots suggest that the CREDI short form is valid and reliable for measuring children's skills and behaviors. CREDI is an open-source tool and consists of a caregiver report format that requires limited training and implementation time. The tool measures motor, cognitive, and socioemotional skills of children under 3 living in low-resource settings.
[8] Used recruitment scripts.
[9] PY1 districts were selected based on ongoing MCSP Ghana intervention sites, geographical location, culture, and socioeconomic demographics.

Attitudes

MCSP selected three districts in Eastern Region and three districts in Upper West Region for inclusion in the sample, then selected two subdistricts within each district. All MCSP-trained CHPS staff and CHVs working in the target subdistricts were invited to join the FGDs. Between July–August 2018 and February 2019, 191 health workers (132 CHOs and 59 CHVs) were included in 51 FGDs (see Table 3). Each focus group contained five to eight respondents.

Table 3. Focus group discussion (FGD) study sample by cadre and location

	Number of Health Worker FGDs and Participants		
	July 2018	**February 2019**	**Total**
Cadre			
Number of community health officer focus groups	10	10	20
Number of community health officer participants	53	79	132
Number of community health volunteer focus groups	5	4	9
Number of community health volunteer participants	29	30	59
Location			
Number of Upper West focus groups	7	8	15
Number of Upper West participants	40	63	103
Number of Eastern focus groups	8	6	14
Number of Eastern participants	42	46	88

Caregivers and Children

Quantitative Sample

Two subdistricts in Eastern Region and six subdistricts in Upper West Region were randomly selected for inclusion in the study. Upper West was oversampled relative to Eastern to align with program reach. MCSP was active in 11 districts of Upper West and six districts of Eastern in PY2. Within each subdistrict, 10 communities were randomly sampled. Twelve families per community were interviewed. The target sample size was calculated assuming a 95% confidence interval, 80% power, 0.30 minimum detectable effect, and allowing for 33% attrition. Families were selected using the list of participants kept by CHOs in each target community. Local CHPS staff helped data collectors identify, contact, recruit, and acquire consent from eligible families in their community. All caregivers interviewed reside in communities scheduled to receive MCSP Ghana ECD programming.

A total of 360 caregivers were interviewed about their children at baseline (July 2018). At endline (February 2019), 282 caregivers we re-interviewed, with as many as possible of the originally sampled caregivers who could be found and consented. Some caregivers who were assessed at baseline could not be found at endline, mainly because they relocated to other communities due to the dry season (see Appendix B). Due to some inconsistencies in the coding of identification variables in the child assessment and caregiver questionnaire, the resulting longitudinal sample consisted of 253 caregivers (see Table 4). On average, children in the sample were about 21 months (1.75 years), with girls comprising 52% of the sample.

Table 4. Longitudinal study sample, by age group at baseline and region

	Eastern		Upper West		Total	
	%	n	%	n	%	n
Child is female	63%	44	48%	87	52%	131
Average child age in months at baseline	12		15		14	
Percentage of children in each age group at baseline						
0–5 months	31%	22	22%	41	25%	63
6–11 months	20%	14	17%	31	18%	45
12–17 months	24%	17	22%	41	23%	58
18–23 months	14%	10	16%	29	15%	39
24–29 months	7%	5	12%	22	11%	27
30–35 months	3%	2	10%	19	8%	21
Total sample	70		183		253	

Qualitative Sample

Local health workers helped MCSP data collectors identify and contact eligible families in their community to participate in the FGDs. A total of 158 caregivers from Upper West and Eastern regions participated in 22 FGDs. Each group contained a maximum of eight participants (see Table 5).

Table 5. Focus group discussion (FGD) study sample, by year

	Number of Caregiver FGDs and Participants		
	PY1	PY2	Total
Cadre			
Number of caregiver focus groups	12	10	22
Number of caregiver participants	78	80	158
Location			
Number of Upper West focus groups	6	6	12
Number of Upper West participants	37	48	85
Number of Eastern focus groups	6	4	10
Number of Eastern participants	41	32	73

Ethical Considerations

This study protocol was approved by the Johns Hopkins University Internal Review Board and the GHS Ethics Review Committee. This study received a nonhuman subject research designation and is not considered formal learning under MCSP. Data collectors obtained informed consent from all participants before qualitative and quantitative interviews were conducted. Quantitative data were collected using tablets, and electronic data are stored in a password-protected account maintained by the local principal investigator. MCSP anonymized qualitative data during FGD transcription and stored them on a password-protected platform.

Limitations

Due to limited time and resources for research within the program, there was no control or comparison group in this study. Therefore, the results are descriptive, and it is not possible to draw any causal inferences about the impact of the MCSP Ghana ECD program on caregiver behavior change or child development.

This sample is not a representative sample of the children ages 0–3 in Ghana or in the focal two regions (Upper West and Eastern); rather, it is a random sample of caregivers with children ages 0–3 from three districts in these two regions who were contacted by local CHPS staff to participate in the program.

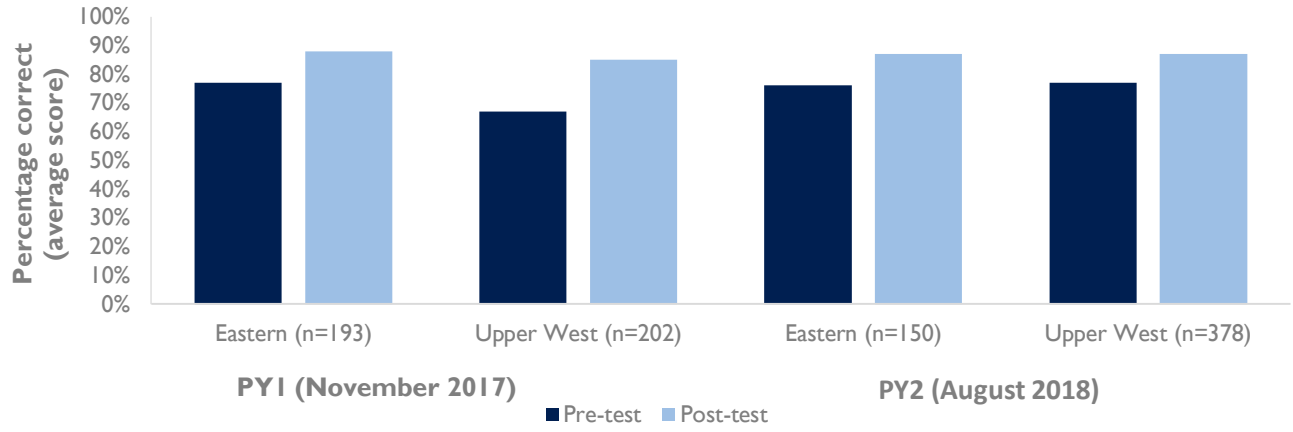
Results

Health Workers

Knowledge Assessment

The results from the pre- and post-tests conducted during the PY1 and PY2 MCSP Ghana ECD trainings showed significant gains in short-term knowledge transfer in both focal regions. Figure 1 demonstrates that participants from both regions on average answered 23 out of 33 questions correctly before the training. At the end of the training, participants from both regions on average answered 30 out of 33 questions correctly. The pre- and post-test scores disaggregated by gender and health worker cadre showed similar gains across these subgroups (data not shown). These results demonstrate that health workers with varying levels of experience appropriately understood key concepts in the newly created MCSP Ghana ECD program. This is notable given the multilevel cascade training model utilized in this program: national and regional-level health service staff received the MCSP Ghana ECD training of trainers and then cascaded the knowledge to district-level staff, who then led trainings for CHPS staff in their jurisdictions.

Figure 1. Program year 1 (PY1) and PY2 average pre- and post-test scores across providers



In February 2019, MCSP collected follow-up data from 92 participants in three districts to monitor whether health workers had retained knowledge from the PY1 training (November 2017). Overall, the frontline health workers who participated in this retention assessment showed similar average scores to those observed during the initial training in PY1 (see Table 6). While there were some declines in scores, frontline health workers from both districts were generally able to retain the knowledge they acquired from the MCSP Ghana ECD trainings.

Table 6. MCSP Ghana early childhood development training knowledge retention results by region

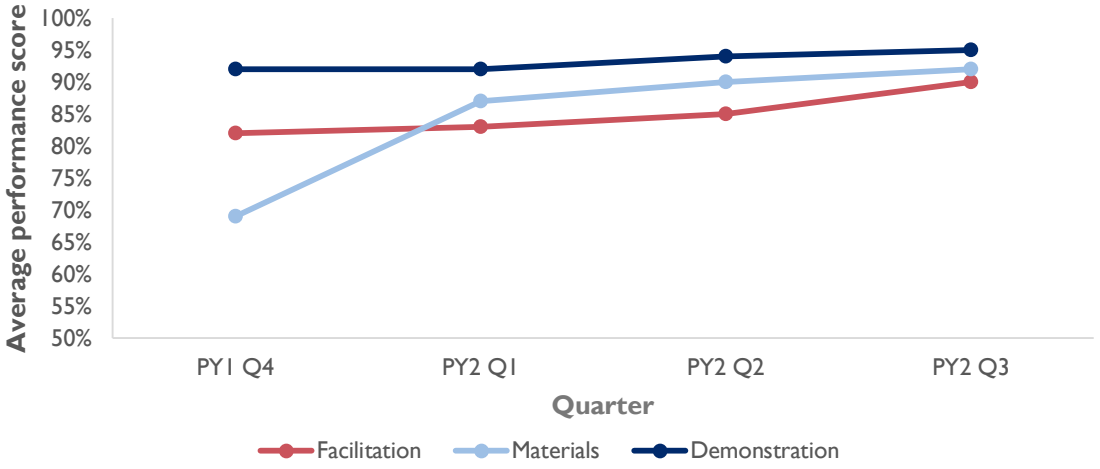
District	Jirapa		Nsawam Adoagyiri		Wa West	
Competency Theme	November 2017 (n = 136)	February 2019 (n = 30)	November 2017 (n = 127)	February 2019 (n = 32)	November 2017 (n = 134)	February 2019 (n = 30)
Overall score	85%	87%	91%	85%	82%	81%
Early brain development	89%	88%	90%	85%	84%	82%
Psychosocial stimulation for children at different ages	78%	85%	93%	84%	76%	80%

Program Delivery

To support continued learning and improvement of ECD activities, MCSP, in collaboration with the GHS FHD, conducted mentorship and supportive supervision visits with CHPS staff who facilitated parenting sessions at 35 MTMSG meetings and 15 CWCs. During the meetings, MCSP and FHD observers rated session facilitators' performance using the MCSP-developed observation checklist.[10] During the supervision visits, there were 784 parents and caregivers (46 males and 738 females) in attendance across Upper West and Eastern regions.

Beginning in late PY1, MCSP observed 50 CHOs during delivery of parenting sessions at MTMSGs and CWCs. By the end of PY2, these 50 CHOs had received four observation visits. Over time, CHOs improved their ability to integrate psychosocial stimulation and responsive care into their routine health and nutrition activities and to effectively facilitate parenting sessions (see Figure 2). Data from the observation checklist revealed that CHOs maintained a high score for demonstration of psychosocial stimulation activities and the learnings from their initial training. Similarly, CHOs continued to improve their skills in facilitation of parenting sessions over time.

Figure 2. Average observation checklist scores for community health officers delivering parenting group sessions in Eastern and Upper West regions (n = 50)



Facilitation

Caregivers in both regions reported strong facilitation skills from the CHOs and CHVs who led their ECD sessions. They shared that health workers were inclusive and respectful, and mentioned that demonstrations of different activities were very helpful for their understanding. A caregiver from Eastern Region said: "We understood all the topics because she demonstrated everything that she taught. For instance, she spread a mat on the floor and used a doll to teach us the proper way of handling the baby so we understood very well." Active demonstrations and hands-on practice are key components of the MCSP Ghana ECD facilitation guidelines, so these responses suggested that health workers were faithfully implementing the program material.

Program Contextualization

Frequency of Sessions

At the outset of the program, MCSP set a target for CHOs/CHVs to hold ECD sessions twice per month ideally or once per month at minimum. When asked about the frequency of ECD sessions, health workers in Upper West and Eastern regions from PY1 and PY2 communities most commonly reported that their ECD

[10] Standards for facilitation include CHOs/CHVs are well organized, have clear roles/responsibilities, and actively involve parents in discussions/problem-solving. Standards for materials use include CHOs/CHVs have all materials and display proper utilization of materials. Standards for demonstration include accurate modeling of games and provision of positive feedback/correction on caregiver game practice.

groups met once per month. A minority of health workers reported meeting every other week or once per week. The most common reasons cited for meeting once per month were that CHOs had multiple groups to cover or that parents could not attend meetings once per week/biweekly due to their other responsibilities. For example, a CHO from Upper West stated: "I could not lead the sessions every week. Sometimes, it is not easy meeting the people every week because of their work schedule and other activities. … During the dry season, we meet twice a month, but now we cannot meet twice a month because of their work schedule." Another CHO from Eastern Region commented, "Some of the mothers are traders and others are farmers, so we organize it every month, the actual date that they will come."

Caregivers corroborated the responses from CHOs and CHVs about session frequency. Caregivers often stated that their groups met once per month, with only a few mentioning having experiences of meeting weekly or biweekly. Some caregivers also stated that it would be difficult to meet more frequently than once per month. One caregiver in Upper West stated: "When the nurse comes, she always says we should do weekly, but we cannot do it weekly. If it is monthly, we can come, but for weekly meetings, the mothers will not get the time to come."

Location

Frontline health workers commonly reported holding ECD sessions during CWCs and MTMSGs. Overall, they reported utilizing CWCs more often than MTMSGs, and only a few health workers also reported holding meeting in other locations, such as at a church. Health workers in Eastern Region predominantly reported using CWCs as the platform for ECD sessions, whereas health workers in Upper West reported using both CWCs and MTMSGs. When asked how easy or difficult it was to organize the ECD group sessions, a CHO from Eastern Region stated: "In our urban setting, it is not like the rural area, where you will be aware of how the community members move. You know they go out and by 7:00 everybody would have come back from the farm. In our setting, you can even wait and go as late as 4 p.m. and 5 p.m. but will not meet anyone because of the work schedules. But we realized that as for CWC, come what may, the parent has the time to join the CWC, even if she has some work to do."

The majority of frontline health workers in Upper West also described using CWCs, some reported using both CWCs and MTMSGs, and a minority of respondents reported using MTMSGs only or in other locations. A CHV from Upper West noted, "My community ECD sessions are during our MTMSG … after which we train other women during CWC sessions and during home visits and even in our own households." Several other health workers also noted that they used both MTMSGs and CWCs, and felt that it was easier to reach more mothers at CWCs. Another CHO from Upper West stated, "We meet the mothers monthly and at the CWC sessions because that's when we can access a lot of the mothers, while at the MTMSG level, most of the mothers do not participant." These findings reveal important considerations for group session structure and key entry points to reach caregivers of children ages 0–3. Future ECD programming should take stock of venues that are convenient for caregivers to encourage regular participation.

Attendance

Caregivers generally reported being motivated to add the ECD sessions into their daily routines. Responses suggest that most caregivers attended the sessions as much as possible, but some reported missing sessions from time to time due to other responsibilities, such as agricultural activities and funerals. A caregiver from Eastern Region said: "I was able to attend all of them. Because of the way they were teaching us, I didn't want to miss out on any of them. I wanted to learn everything so that I would teach my child." A caregiver from Upper West stated: "I have been able to attend meetings for the past 6 months. I go to learn a lot of things on how to take proper care of my children. When I go for meetings in a particular month and they teach me how to play with my children for them to be happy, I always want to go for the subsequent months to learn more."

Feedback from health workers generally agreed with caregivers' responses and in some cases suggested that attendance increased over time. For example, a CHV from Upper West noted: "When we started initially, most mothers do not even attend [MTMSGs], but after some several parenting sessions, the attendance increased. This was because of the benefits derived from the program. They all now actively participate in all

sessions we organized, this has made every session easier for us as volunteers. Some of their husbands bring their children for CWC and ECD sessions when the child's mother is busy at home or in the farm."

Group Composition

Health workers reported a large range in the sizes of their ECD groups, from 10 in some places and up to 60 in others. Some health workers were not able to give a group size because they felt that the attendance changed substantially from week to week. The most common responses were between 15–30 people; reported group sizes tended to be smaller in Eastern Region. The majority of health workers reported that there was a mix of older and younger mothers in their groups, but younger mothers were the most commonly reported group attending the ECD sessions. Only one frontline health worker stated that there were no young women in their group.

Health workers commonly reported that there were a few fathers in their groups. A smaller group reported that there were no males present in their groups, and no health workers reported that there was an equal number of males and females or more males than females in their groups. For example, one CHO from Eastern Region noted: "Typically, I get between 25–30 parents. Occasionally, I get some men participating, but the majority of participants are often women. The younger parents constitute about 75% of participants in a typical session, whereas the older parents constitute about 25%." Similarly, a CHO from Upper West stated: "In my communities, the average is about 25–30 [parents], with the younger population taking about 20 and the older population taking 10. The males are about four males: two younger males and two older males."

A small number of respondents from Upper West also suggested that men determined if women were permitted to attend the ECD sessions. A CHV from Upper West explained: "There is a saying in Dagaare that 'the beginning of everything is not easy.' When we started, it was difficult for us to come together in my community. In the beginning, when I call the parenting session meetings, the men will not come, but they would not allow their wives to attend. It was later that most of the men allowed their wives to attend after several efforts I made in explaining the importance of the program to them. I did this with the nurse before both men and women attend. Men now take care of children when their wives are working." These findings highlight the importance of male engagement in ECD sessions. Male caregivers should be consulted and actively involved in initial stages of programming. Their buy-in is essential to full family unit participation.

Challenges

Health workers noted challenges regarding motivation of caregivers to attend the group sessions, local language issues, and resources needed for the sessions. A CHO from Eastern Region stated: "I have an appeal I want to make. Some of the parents need some motivation. It is difficult for some of them to attend CWC. I suggest we should have a token to reward mothers who regularly attend the sessions in order to encourage others to attend."

Related to local language, some CHOs reported difficulty with delivering the sessions because they did not speak the mother tongue of the group participants. Health workers raised this issue in both Upper West and Eastern regions. One CHO from Eastern Region stated, *"I can't speak Twi very well and so during the sessions, expressing myself for the mothers to understand was not easy. They can't speak my language and most of them do not understand English either, so I had to try my best to speak the Twi into details for them to understand. Although I can express myself but because of language barrier, it was not easy..."*

One CHO from Upper West noted that their CHV was helpful for translating the messages into the local language: "Sometimes it's not easy to explain some of the words in the local dialect. However, with the help of the volunteers who speak local dialect, because the volunteers were also trained, they help a lot. My volunteer facilitates most of the sessions because of the language. It's only if he is not going that I come in and explain things to the mothers."

Related to resources for the sessions, CHOs mentioned difficulties with the space and materials. For example, a CHO from Upper West noted: "What I will add is: It's good, but if we can get some support financially to

help us carry out our activities, I think it will help especially, in terms of making the toys for the mothers. As you are going, you also have to make something and send. You ending up dipping into your own pocket. So if this session can be helped financially, I think it will help." Another CHO from Upper West stated: "The mothers don't bring the things they use to play with their children in the house to the sessions. So we use what is at the place to demonstrate. The environment is also a problem. When you are having the sessions and other things are happening around you, the concentration is not always there."

A number of caregivers also identified lack of toys or other learning materials (i.e., books) as a challenge with the ECD sessions. Specifically, caregivers noted that there were no toys/materials available during their sessions and that they would appreciate if health workers could bring them for practice. A caregiver from Eastern Region stated: "Materials for demonstrating some of the activities should be provided to support and encourage the parents. This is because some parents cannot afford to bring some of these materials and therefore are not encouraged to come for the parenting sessions."

Caregivers also highlighted that health workers should continue to emphasize how local materials could be used as toys with children to keep caregivers motivated. A caregiver from Eastern Region said: "With regard to the materials for teaching the day we met at the program, we discussed that if you go to villages, some people do not have anything. So the person doing the home visit should get things like plantain leaves and cement papers. For instance, we can use scissors to cut the cement papers. Some do not have anything, so when you are going to teach them and you don't go along with such things, they will not get anything to teach their children. They will be worried that they need money to go and buy the items, but with the local materials, they can get things to teach their children."

These qualitative findings illustrate what ECD sessions look like in different communities. This detailed understanding of program implementation in pilot districts aids MCSP and the GHS to clarify the resources (human and material) required to implement the program successfully and sustainably in other districts. Based on these observations, a typical ECD session was held once per month on a growth monitoring day at a CWC. One could expect to find approximately 25 people, mostly younger mothers. The session would be inclusive and active, with demonstrations from the facilitator. There would be distractions due to some mothers arriving late or leaving early, but the majority of those present would participate in the demonstrations and discussions. Some mothers might not participate due to shyness or a language mismatch with the facilitator, or some caregivers may not be able to practice the target skills due to a limited number of toys available at the session. There would not be a supervisor present at the session to observe or mentor the facilitator.

Caregivers

This section summarizes findings from the baseline (July 2018) and endline (February 2019) data collection. MCSP collected quantitative data from PYI communities in two subdistricts in Eastern Region and six subdistricts in Upper West Region. Qualitative data were collected from communities in districts from PY1 and PY2. The findings summarize changes in child development and caregiver's practices, as well as changes in caregiver's perceptions on the implementation of the MCSP Ghana ECD program.

Household Characteristics

Table 7 presents a breakdown of the caregiver characteristics by region. These data were collected to gain a better understanding of the caregivers being served by the program and to investigate which relationships between caregiving practices and child development were most relevant in implementation areas. The majority of the respondents were mothers (98%) and the rest were grandparents, fathers, and other family members. Overall, caregivers in Eastern Region had higher levels of education compared to mothers and fathers in Upper West Region. Caregivers in Upper West Region were more likely be married than caregivers in Eastern Region.

Table 7. Caregiver characteristics by region

	Eastern	Upper West	Significant difference
	n = 70	n = 183	
Mother age (average)	27	29	
Mother can read	49%	21%	***
Mother education			***
• None	14%	64%	
• Primary	62%	29%	
• Secondary	10%	3%	
• Higher education	0%	0%	
Father age (average)	32	37	***
Father can read	76%	28%	***
Father education			***
• None	16%	62%	
• Primary	33%	19%	
• Secondary	27%	10%	
• Higher education	3%	5%	
Child's parents are married	83%	96%	***
Number of children in home (average)	1.09	1.00	

Note: *p < .05, **p < .01, ***p < .001

Household Possessions

Caregivers were also asked about the common household items and resources they owned to approximate relative family wealth. Caregivers in both regions reported having more livestock at endline compared to baseline (see Table 8). Overall, there were no significant changes in the average number of household possessions or appliances from baseline to endline. The results disaggregated by region reflect the more urbanized communities in Eastern Region compared to the more rural agricultural communities in Upper West (see Appendix B).

Table 8. Family household possessions, Upper West and Eastern

	Baseline	Endline	Significant difference
	n = 253	n = 253	
Radio	58%	49%	
Television	49%	49%	
Refrigerator	13%	13%	
Bicycle	45%	41%	
Motorbike	46%	49%	
Mobile phone	87%	91%	
Electricity	73%	74%	
Land	92%	92%	
Livestock	80%	87%	*
Average number of possessions (out of nine listed above)	5.4	5.5	
Average number of appliances (out of seven listed above)	3.7	3.7	

Note: *p < .05

Caregivers' Breastfeeding and Nutritional Practices

Given the strong linkage between positive nutritional practice and early stimulation for optimal brain development, MCSP also evaluated caregivers' breastfeeding and nutrition behaviors. While changing nutritional practice was not specifically addressed in the MCSP Ghana ECD 0–3 Toolkit, CHOs/CHVs received training on health and nutrition guidelines via other MCSP Ghana programming; this is part of their overall mandate.

Nearly all caregivers reported breastfeeding their children at some point, and those with very young children reported ongoing breastfeeding. There was a significant change in drinking from a bottle between baseline and endline. This is likely because children were older at the time of the endline and therefore more likely to be drinking from a bottle as mothers return to work or share caregiving responsibility with others. For children 1 year or older, caregivers reported providing them with three different types of food per day on average. Overall, there were no significant differences in children's acceptable dietary diversity or in the total food types eaten by the child (see Table 9). Caregivers in Upper West were more likely to reporting feeding their children roots, green vegetables, other fruits, and meats compared to caregivers in Eastern Region (see Appendix B). This could be due to the more agricultural lifestyle in Upper West compared to Eastern Region; families may have better access to fresh fruits and vegetables in the more rural areas than those in more urban locations.

In terms of appropriate infant and young child nutrition, these results suggest that breastfeeding practices for children in the first year of life are relatively strong in target communities, but more support is needed for older children. On average, less than half (40%) of children older than 12 months were receiving the minimum suggested dietary diversity. The majority of children's diets consisted of grains rather than fresh fruits, vegetables, and protein. Deficient nutrition during this sensitive period could stunt the developmental trajectories of children's physical and cognitive growth, and should be the focus of future interventions.

Table 9. Caregiver breastfeeding and nutritional practices

Percentage of caregivers who answered yes to the question	Baseline	Endline	Significant difference
	n = 253		
Ever breastfed child	100%	99%	
Breastfed yesterday (child < 12 months)	95%	95%	
Fed with a bottle yesterday (child > 12 months)	9%	0%	***
Total food types eaten by child yesterday (child > 12 months)	3.3	3.3	
Acceptable dietary diversity (4+ food types) (child > 12 months)	42%	38%	
Percentage of children given the following foods yesterday:			
Grains	83%	85%	
Sweet potatoes, squash, carrots	16%	5%	**
White potatoes, cassava, other roots	13%	6%	
Green leafy vegetables	40%	31%	
Mangos, papaya	7%	2%	*
Other fruits and vegetables	20%	21%	
Organ meat (kidney, liver, etc.)	4%	2%	
Other meat (chicken, beef, pork, etc.)	12%	13%	
Eggs	12%	6%	
Fresh or dried fish	27%	31%	
Beans, lentils, nuts	10%	17%	
Milk, yogurt, cheese	11%	13%	
Oils, fats, butter	27%	33%	

Percentage of caregivers who answered yes to the question	Baseline	Endline	Significant difference
	n = 253		
Sugary foods/sweets	22%	30%	
Spices	29%	31%	
Grubs, snails, or insects	1%	1%	

Note: *p < .05, **p < .01, ***p < .001

Stimulation and Care Practices

Finally, MCSP asked caregivers about the learning environment in their homes and responsive caregiving practices. The MCSP Ghana ECD program did not provide books or toys to participating families but did teach parents how to make toys and books from locally available materials. Increasing learning and play behaviors was another core goal of the program.

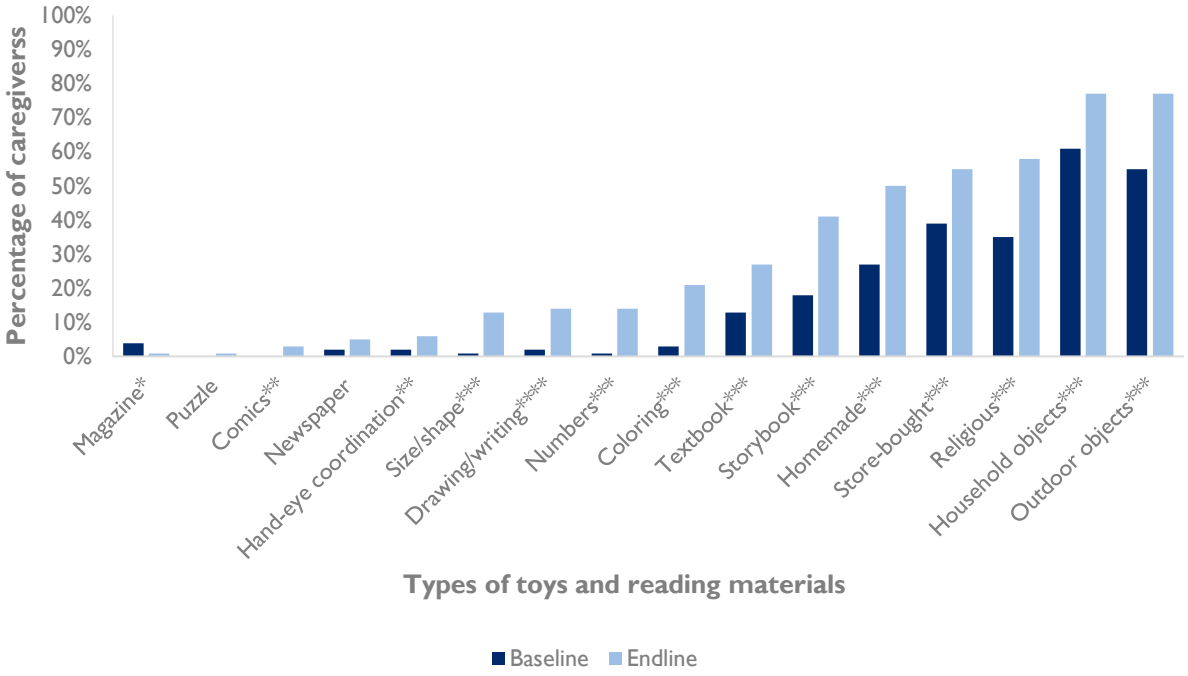
On average, caregivers reported having two types of reading materials in their homes at endline: most commonly religious books or storybooks (see Table 10). Caregivers reported having about three types of toys for their children, more commonly household objects, outdoor materials, or store-bought toys. There were statistically significant improvements from baseline to endline for most of the types of reading materials and toys, especially in the number of storybooks and homemade toys. Caregivers in Eastern Region were more likely to report a higher number of reading materials and more store-bought toys at baseline, but overall at endline, there were no significant differences between the reading materials and types of toys reported by caregivers in the two regions (see Appendix B and Figure 3). This suggests that MCSP's demonstrations on utilizing/repurposing common household items enabled greater access to early learning resources for all children, especially those living in areas that are more rural.

Table 10. Reading materials and toys

	Baseline	Endline	Significant difference
	n = 253		
Average number of types of reading material	1.1	2.3	***
Average number of storybooks	0.7	1.2	**
Average number of types of toys	1.9	3.2	***

Note: **p < .01, ***p < .001

Figure 3. Changes in types of reading materials and toys for children (average number of caregivers who reported having a type of toy or reading material in their home)



Note: *p < .05, **p < .01, ***p < .001

On average, at endline, caregivers reported engaging in four types of learning or play activities with their children in the past week (see Table 11). The most common activities were hugging children, taking them outside, and singing to them, and the least common were reading stories and telling them stories. There were significant changes from baseline to endline in the average number of stimulating caregiving practices (3.3 versus 4.0), particularly in activities like playing with their children (39% to 59%) and drawing or writing with them (19% to 45%). At baseline, caregivers in Eastern Region were significantly more likely to report engaging in activities such as singing with their children or hugging them compared to caregivers in Upper West Region. At endline, the only significant difference between regions was observed in drawing or writing, with caregivers in Upper West more likely to report these activities (see Figure 4).

Overall, from baseline to endline, half of the caregivers reported engaging in more psychosocial stimulation and responsive care practices in both regions (see Figure 5). Finally, there were significant increases in the average number of hours reported by caregivers that young children spent in the care of another child or alone without supervision; these changes were observed in both regions. MCSP field staff observed that this may be due to seasonal changes and the height of planting season for many undertaking subsistence farming during the time of the endline assessment (see Appendix B).

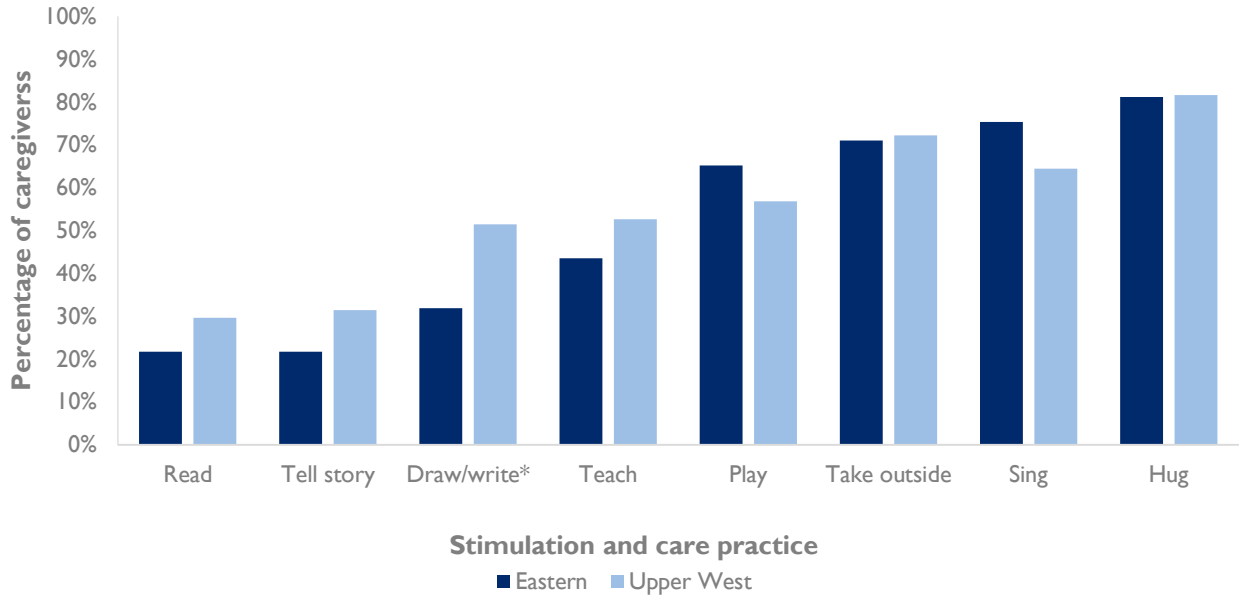
These results suggest that the parenting sessions contributed to positive caregiver behavior change. This is a promising result given the relatively short period between the pre- and post-test, as well as the relatively light-touch implementation. From participation in approximately six parenting sessions spread over 6 months, caregivers reported significant increases in psychosocial stimulation practices with their young children. More in-depth observations should be conducted in the future to confirm these self-reports, but these results provide encouraging initial indications of behavior change. Future research should also investigate which parents are more likely to report engaging in fewer stimulation and care activities with their children over time, as this may indicate that more intensive or different services are required by these families.

Table 11. Stimulation and care practices in the past week (n = 253)

	Baseline	Endline	Significant difference
Average number of stimulation/care activities in the past week (out of eight listed in this table)	3.3	4.0	**
Read	16%	27%	**
Tell story	24%	29%	
Sing	68%	67%	
Take outside	57%	70%	**
Play	39%	59%	***
Draw/write	19%	45%	***
Teach	34%	50%	***
Hug	79%	80%	
Average time child spends in care of another child (hours per day)	1.5	2.1	***
Average time child spends alone (hours per day)	0.8	1.4	***

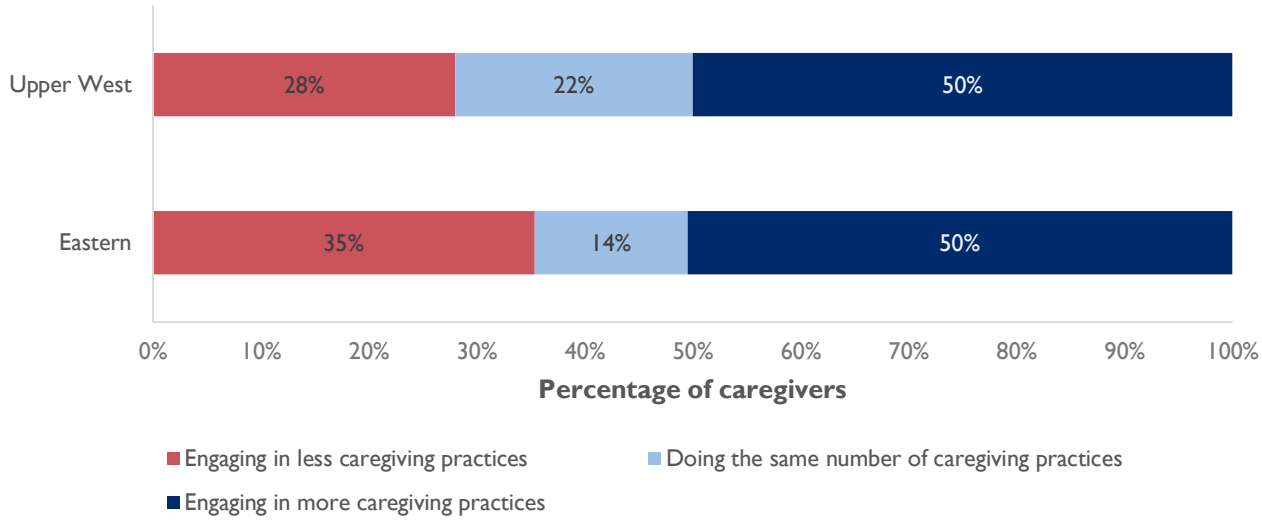
Note: *p < .05, **p < .01, ***p < .001

Figure 4. Stimulation and care practices at endline, by region



Note: *p < .05

Figure 5. Changes in percentage of caregivers that engage in stimulation and care practices (from baseline to endline) by region (n = 253)



Behavior Change: Qualitative Results

FGDs with caregivers revealed a number of different ways in which parents perceived changes in caregiving practice due to participation in the MCSP Ghana ECD sessions. The most common change caregivers from Eastern and Upper West reported was using less harsh discipline. A caregiver from Upper West said: "The ECD activities have impact on us and our children in the sense that, at first, parents use to insult and beat children to correct them when they do things wrong. This use to make children be afraid of their parents and don't get close to them. When parents call their children, they easily refuse to come with the mindset that the parents will beat them. But with the introduction of the ECD activities, which have made parents resist from using insults and beatings on their children, this has made these children feel courageous and fearless, making the bonding of children to parents very strong."

Health workers corroborated that they also felt that caregivers began engaging in less harsh discipline but also noted that behavior change like this takes time. A CHO from Eastern Region stated: "I could see that the insults and beatings have minimized. When you go to the field to check whether learning has taken place or not, you would see that the beatings and insults have minimized." Another CHO from Eastern Region noted: "I will not say all of them have changed, because some have changed and others have not, because for some of them, they think talking to their children will not help. So even after ECD, they still beat their children because if they are talking to them and they don't understand, they too will not have that time to wait. So they will still beat them. Others too have changed; now they talk to their children in a polite manner for them to understand. So, like my sister said, for the behavior change, it will take a long time for some people to change, but most of them have changed."

The second most common behavior change reported is engaging in more play and early learning activities with children. A caregiver from Upper West stated: "What they taught is good. We used to have our children, but we do not know how to play with them, but with the program now, we know at every stage of your child development, this is how you should play with that child."

Multiple caregivers from both regions noted that they appreciated the sessions on making homemade toys because it allowed them to create more toys for their children, and that introducing toys and games was a relief for them because it allowed them to have more time to finish their chores. A caregiver from Eastern said: "I have a tin in which I have put stones. When I shake the tin, it rattles, and he becomes very happy, then I am able do have time for my work. That's the one I like most."

Following discipline and play behavior change, caregivers most often gave examples of improving health practices, such as handwashing, sanitation before feeding children, and use of mosquito nets. A caregiver from Eastern Region stated: "They taught us to wash our hands with soap under running water before playing with our babies because the baby can put our dirty hands in their mouths. That's the topic I like; I have learned how to keep my baby neat."

Another caregiver from Upper West said: "The nurses and volunteers have taught us how to wash our hands before picking up our children or when about to give them food. We were also taught to wash our children hands after they defecate or when we are about to give them food. This has really helped in preventing children from running diarrhea and falling sick." These findings demonstrate that health workers successfully merged health and ECD messages during group sessions as intended. Health workers were able to highlight key health messages integrated into the MCSP Ghana ECD 0–3 Toolkit in a clear and concise manner.

A number of caregivers also noted that through greater engagement with their children during play activities, they were more aware of when their children felt ill or were potentially at risk of experiencing developmental delays. For example, a caregiver in Upper West noted: "The lessons are very interesting to me because it is easy to detect ill children during plays. For instance, when you play with your child every day and he/she response to the plays, it shows the child is healthy, but some days when you play with the child and the child is not interested in the play or not able to play, it helps you realize that the child is sick. You can take the child to the hospital for medical attention."

Another caregiver from Upper West said, "The play is good because at first, somebody can give birth to the child, and the child cannot hear or the child cannot see, but this play has made us to detect all those things." Fewer responses from caregivers also mentioned behavior changes related to prenatal practices, soothing children, nutritional practices, and safety.

This information from caregivers and health workers suggests that the MCSP Ghana ECD program has contributed to positive changes in caregiving behaviors and that continued attention to psychosocial stimulation is necessary. Health workers and caregivers report decreases in harsh discipline practices and increases in play, which represent a substantial improvement in children's home environments. However, caregivers also reported behaviors such as giving their child a toy to stay occupied while they finished their chores and did not report any feedback related to the more nuanced play and stimulation messages included in the ECD session material (e.g., differentiated activities by age). This suggests that caregivers are beginning to change their childcare behaviors, but repeated inputs on these topics is necessary for them to fully internalize all program messages. This finding is consistent with other behavior change research that suggests that multiple exposures are necessary to drive sustainable behavior change in adults.

Fathers

Interview guides did not specifically ask about changes in men's behavior, but many respondents spontaneously offered this information. Caregivers and health workers generally reported that the men who attended ECD activities also took up the lessons they had learned at home. One caregiver in Eastern said: "Previously, the men taught that it is the women alone who have to play with the children. Because of these lessons, some men are now participating and playing with the children." Another caregiver from Upper West stated: "Man always goes out, and when he comes back to the house, he takes the child outside and shows the child names of birds, trees, etc. But at first, all these things were not there." Only one caregiver reported that her husband thought the games were too childish and not suitable for adults.

Caregivers also reported that the ECD sessions were helping to improve relationships between husbands and wives. A caregiver from Upper West stated: "The nurses did well in training us on how to play with our children; we didn't know how to leave our children for them to be playing while we are working. Our husbands were not getting chance to take care of our children, but with this program, they are doing well in terms of helping us take care of our children. Due to this program, there is peace and unity among us the wives and our husbands, including our children."

These data suggest that future programming could take an intentional approach to engaging male caregivers. Caregivers and health workers suggest that there is already some interest from fathers in target communities, but group sessions led by health workers may not be the best way to reach them with information about psychosocial stimulation for their children.

Challenges

One challenge highlighted by caregivers in several communities related to spreading the word about sessions so that more mothers would attend. Caregivers suggested that some parents were not benefiting from the sessions because they were not actively in contact with the health facilities. They suggested that it would be helpful to make stronger connections with local leaders and religious groups to share information about the sessions and encourage stronger caregiver participation. A caregiver from Eastern Region stated: "From birth to 1.5 year, women are committed to the weighing. At that time, they get the vaccinations and teaching on how to cater for the children. From that point, they no more attend the weighing, so as for my opinion is that we should notify elders of the various towns, announce, and do it for everyone to benefit from it. With that, it would not only be beneficial to mothers with children from birth to 1.5 year but to everyone."

Health workers also identified challenges related to caregiver attendance. They noted that some parents did not stay for the entirety of the ECD sessions but instead came late or left early. Being "in a hurry" was especially common for caregivers in Eastern Region. A CHO from Eastern Region noted: "In this health center, for instance, if you want to do ECD during the morning, teachers and other workers will come but not sit down. They want to weigh their children quickly, so most at times, you don't get teachers and working class mothers at the center. As for traders and those who don't have time to work, you can get them. Even for them, you can get around 20. Some of them come around for some time and leave. You don't get all of them together at a time."

This information may indicate that additional delivery mechanisms are needed to reach all caregivers. These caregiver and health worker reports indicate that there were some caregivers who did not regularly take their children to health facilities and others who could not regularly attend group sessions. Delivering information about the importance of psychosocial stimulation through other types of community mobilizers (e.g., child protection officers) or through other means (e.g., home visits or social media) could be beneficial in the future.

Child Development

Finally, caregivers also responded to questions related to their children's motor, cognitive, and socioemotional development using the CREDI tool. Questions included items such as:

- Motor: Does the child grasp onto a small object (e.g., your finger, a spoon) when put in his/her hand?
- Cognitive: Can the child say one or more words (e.g., names like "mama" or "ba" for "ball")?
- Socioemotional: Is the child kind to younger children (e.g., speaks to them nicely and touches them gently)?

There were significant improvements reported in overall child development in both regions from baseline to endline. Caregivers in Upper West Region reported stronger development compared to caregivers in Eastern Region at endline. Figure 6 shows children's overall development strengths by age. The largest developmental progression was observed in the youngest group (0–5 months). For full child development results, see Appendix C.

Figure 6. Changes in child development by age group

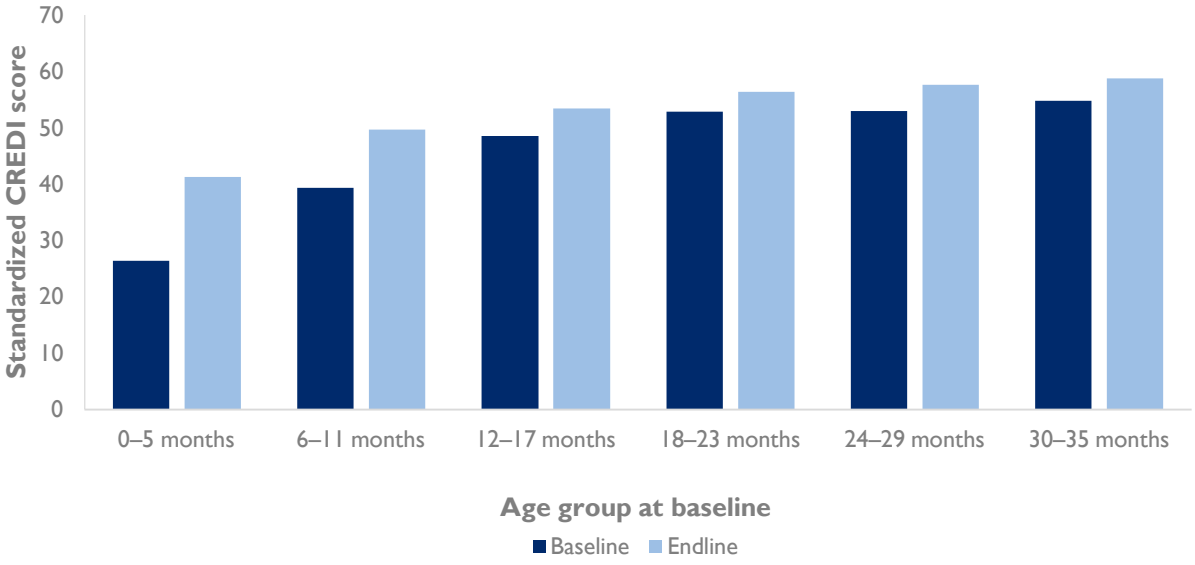


Table 12. Standardized Caregiver Reported Early Development Instruments (CREDI) Score by region (n = 237 children)

	Eastern		Significant difference	Upper West		Significant difference
	Baseline	Endline		Baseline n = 66	Endline n = 171	
CREDI						*
0–5 months	26.8	-		26.2	-	
6–11 months	39.9	40.0		48.4	39.5	
12–17 months	48.8	49.7		53.1	47.7	
18–23 months	52	53.6		52.4	52.8	
24–29 months	55.5	55.7		54.6	56.5	
30–35 months	56.4	58.4		39.1	58.5	

Note: *p < .05

Taken together, information from the caregiver questionnaire and child development assessments (see Table 12) provide information on important predictors of child development. Multivariate regression analyses that include variables from the caregiver questionnaire find that age, number of reading materials, number of caregiving practices, and an acceptable dietary diversity were significantly positively related to child development scores (see Figure 7 and 8). There were no significant relationships in this data set between child development and child gender, socioeconomic status, or region.

In summary, the team had three key findings following the multivariate regression analysis:

- Children whose caregivers reported engaging in more psychosocial stimulation and responsive care practices displayed stronger overall development compared to children of caregivers who reported fewer caregiving practices.
- Children whose caregivers reported having access to more reading materials displayed stronger overall development compared to children of caregivers who reported owning fewer reading materials.

- Children whose caregivers reported providing their child with an acceptable dietary diversity (four or more food types) showed stronger development than children with a poor dietary diversity.

Figure 7. Relationship between child development and caregiving practices

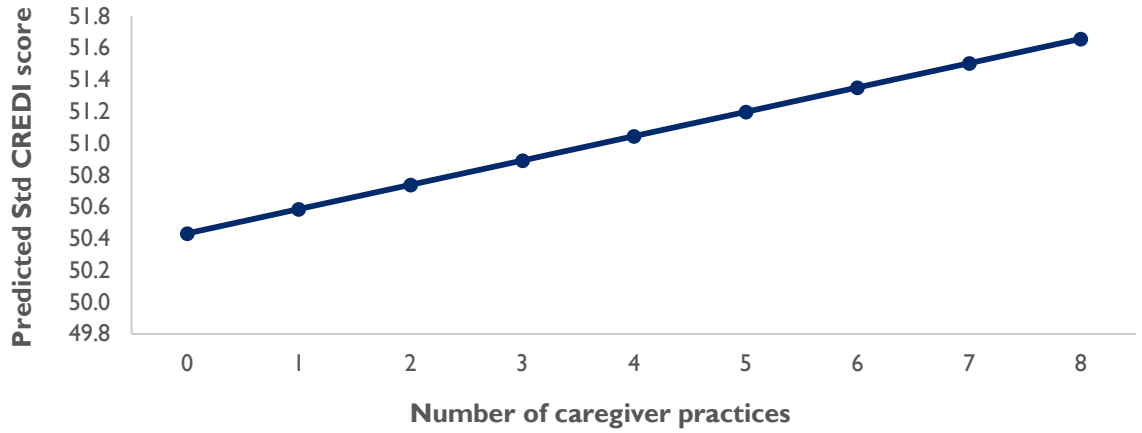
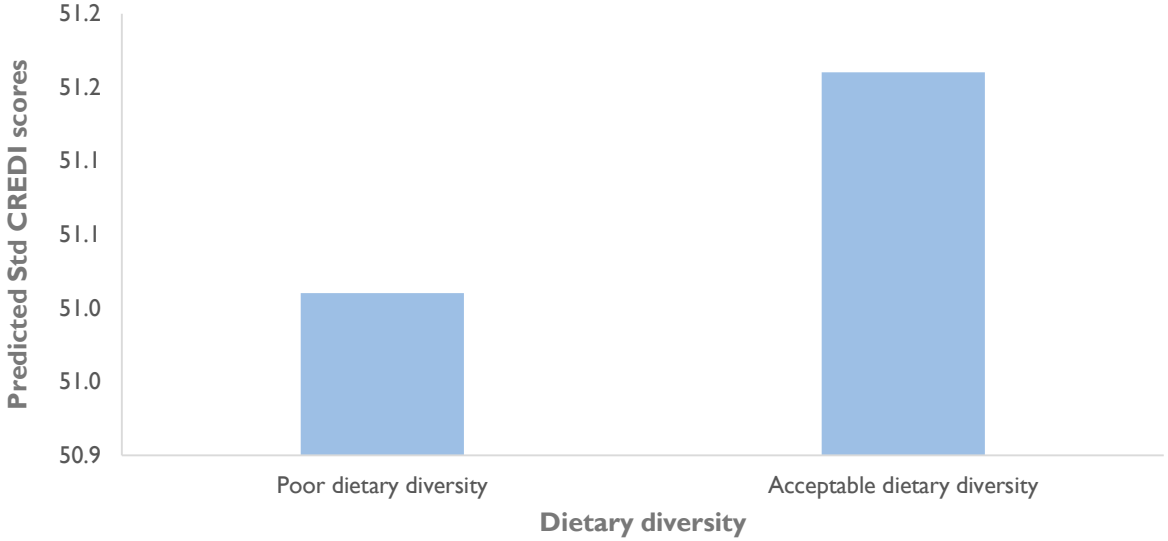


Figure 8. Relationship between child development and caregiving practices



Changes in Child Development: Qualitative Results

During FGDs, caregivers also reported seeing changes in their children. Many caregivers provided examples of their children becoming more interactive and more communicative about their needs. Caregivers often gave specific examples of the different types of games their children now play, including singing alphabet songs, pretending to cook, playing football, and generally following directions well. A caregiver from Eastern Region said: "Previously, my baby was too quiet; now, he can call me to come and play football. When I kick, he will also kick back, and now he has changed into a very active child." Another gave the example: "Initially, my 2-year-old child will just put the hand into food and eat without washing the hand, but after I learned and taught him these things, he will tell you 'my hand,' and you have to wash the hand before he will eat the food. Sometimes too when he is done, he will tell you, 'Mom am done,' and I will tell him this is water, come and wash your hand. Sometimes too I ask him, '[Son], which part is this?' and he will say, 'This is my head.' '[Son],

which part is this my hand.' Although he hasn't started schooling, through those games, he has learned a lot of things because of what we learned and taught them."

A number of parents gave examples that compared their youngest child with their older children and reported believing that the younger child was better off than the older child because of what was taught at the ECD sessions. For example, a caregiver from Eastern Region stated: "I did not get the opportunity to give my first son, who is 10 years old, this training, but the younger one who benefited from this training is more active. He runs around a lot and plays around the house. If you mention your name to him, he always remembers and mentions it anytime he sees you. He's just 1 year and 2 months old, but he's able to mention the name of everyone in my house." Another caregiver from Upper West said: "When I gave birth to one of my children, she was sick to the extent that I nearly gave up on her. ECD parenting sessions have come to save my child from sickness. The child has now become active and plays with other children very nicely."

Observations from health workers corroborated the changes expressed by caregivers A CHO from Upper West noted, "A certain woman came to me yesterday and asked whether it was normal for a child to start speaking earlier because her child has started speaking earlier than all her other children and the people are all saying is because of ECD." Another CHO from Eastern Region said: "Yes, I have a child in my community who was not walking at a certain month, and the mother of the child started practicing the sessions she has learned ,and in no time, the child started picking up and has even started walking as we speak. So because of that, the mother does not want to miss one session."

Conclusion

The MCSP Ghana ECD approach aligns with the global movement toward integrating ECD for young children into health care services. The quantitative and qualitative results from this assessment suggest that the MCSP Ghana ECD program successfully trained 2,075 service providers in Upper West and Eastern regions, who went on to effectively teach caregivers about early stimulation and responsive care, contributing to improved child development outcomes. This experience also generated important suggestions for future ECD work in Ghana.

Attendance

Health workers and caregivers reported that ECD sessions typically take place monthly during CWC sessions. MTMSGs are more common in Upper West, but growth monitoring days at CWCs were reported by health workers and caregivers to be common meeting points in both regions. Respondents report that typically 15–30 caregivers attend the ECD sessions and that groups are composed of mostly women as well as a few men.

FGD data also suggested that caregivers regularly attend the ECD sessions. Most caregivers reported being motivated to attend the sessions and only missing sessions occasionally due to other work responsibilities or funerals. Responses from health workers corroborated these responses, and some even suggested that attendance has increased over time as caregivers better understand the benefits of the ECD sessions.

In summary, average attendance at ECD sessions appears to have been beneficial. However, qualitative data suggested that some caregivers in target communities were not regularly connecting with health services and therefore did not attend all group sessions. This indicates that program administrators should consider additional delivery platforms to reach all caregivers. In the future, delivering information about the importance of psychosocial stimulation through other types of community mobilizers (e.g., child protection officers) or through other means (e.g., home visits or social media) would be advantageous.

Training

Quantitative and qualitative data found that health workers have been effectively delivering program content. This is an especially important finding given the cascade training approach implemented during this program. Results from assessments of health worker knowledge about psychosocial stimulation showed that trainees

gained and retained substantial knowledge from the MCSP Ghana ECD trainings. Observations of session delivery demonstrated strong adherence to the program design over time. Feedback from caregivers also suggests that they are satisfied with the facilitation techniques used by the health workers.

Behavior Change

Quantitative and qualitative data suggest that the MCSP Ghana ECD program contributed to positive changes in caregiving behaviors. Study results displayed significant increases in psychosocial stimulation and responsive care activities over time in both Upper West and Eastern regions. FGD data from health workers and caregivers also contained numerous references to positive changes in caregiving behaviors. Health workers and caregivers report decreases in harsh discipline practices and increases in play. In addition, FGD data suggest that caregivers are still receiving important health messages (e.g., handwashing, exclusive breastfeeding, sanitation, and malaria prevention). The data collected did not find substantial differences in caregiver behavior change related to region of country, suggesting that caregivers in rural and urban areas benefited from the MCSP Ghana ECD messages.

Data from multiple sources also suggested that children are already benefiting from improvements in caregiving practices and home environments. This study cannot make causal inferences about impact of the program on children, but trends in quantitative and qualitative data suggest the MCSP Ghana ECD program contributed to positive development for young children. There were statistically significant improvements in overall development for children ages 0–3 in both regions between the CREDI pre- and post-tests (see Table 12). In addition, caregivers and health workers gave examples of positive changes in children's development. Finally, quantitative data showed a significant positive relationship between positive caregiving practices and children's development, highlighting the importance of this work in Ghana.

Challenges

The most common challenges reported by respondents were related to attendance, play materials for sessions, and local language mismatches. Health workers suggested that although growth monitoring days at CWCs were good for bringing many caregivers together, they did not necessarily reach all parents of young children in their communities. They suggested actively reaching out to other community and religious leaders to encourage more families to attend the ECD sessions. In addition, health workers reported that caregivers were not always present for the entirety of the ECD sessions. Continuing to emphasize the importance of the ECD sessions and making them as interactive as possible are important to maintain interest from the community.

Caregivers and health workers also noted concerns about lacking play materials during the ECD sessions in their communities. They appreciated the lessons about how to make toys from local materials but also highlighted that appropriate toys/materials are necessary to have during the sessions. Caregivers enjoyed the demonstrations given by health workers and felt that these practical components were most helpful for their learning.

Finally, health workers in some communities reported having difficulty communicating with caregivers due to language differences. One solution found by CHOs was to leverage CHVs for translation support. CHVs are usually members of the community who speak the same local language as caregivers and other dialects spoken by CHOs, so they can serve as important support staff in these cases.

Recommendations for Future Programming

MCSP's implementation experience generated important suggestions for future ECD work in Ghana. Recommendations for the Government of Ghana, particularly the GHS, and other ECD partners include:

Platforms and Attendance

- Contextualization of new parenting groups is key to the success of the program. Communities have different needs and schedules, and it is important for providers to take the time to understand these needs when organizing a new activity, such as a parenting group. Building onto existing groups can often be a good place to start. Part of this contextualization is also understanding the language needs of the community members. As much as possible, content should be delivered in the mother tongue of caregivers to maximize behavior change potential. For a program like this in the future, this might mean that CHVs deliver the content with oversight and supervision from CHOs.

- It is important to continue with the approach of reaching parents through various entry points and platforms. The health sector provides the most promise for leadership of the integrated ECD programs for children ages 0–3 given routine growth monitoring and vaccination services, but no one touch point will be adequate for serving all children. Cross-sectoral collaboration and linkages will also strengthen the impact of such programs because the key messages are reinforced for parents when they hear similar messages from multiple sources. Parenting groups led by frontline health workers should be complemented with efforts to reach parents through other outlets, such as church groups, home visits, or social media.

- To support continued attendance at parenting groups, providers must highlight the importance of engaging in early stimulation throughout the critical period of brain development (i.e., from birth to age 3). This is particularly important for groups meeting during CWCs, as caregivers/children typically end frequent routine visits for growth monitoring at age 2 in Ghana.

- Future programs would benefit from motivating caregivers to attend sessions. Items of recognitions, such as certificates of completion or recognition at community events, can be used to motivate and encourage mothers who attend all sessions and as a form of encouragement for others to attend more frequently.

- The MCSP Ghana ECD program used multiple implementation platforms for program delivery and sensitization, including MTMSGs, CWCs, home visits, religious fellowship groups, community meetings (*durbars*), parent-teacher association meetings, and counseling during antenatal care visits. In future programming, MCSP recommends each community select one implementation platform for full session delivery and at least one more for sensitization. For more information about the strengths and limitation of different delivery mechanisms in Ghana, see Appendix E in the MCSP Ghana end-of-project report.

Behavior Change

- Quantitative and qualitative data suggest that the program made substantial contributions to behavior change for caregivers of young children in urban and rural areas of Ghana. However, global research finds that behavior change takes time and reinforcement. For example, the most common behavior change reported during FGDs was a decrease in harsh discipline. While this represents a substantial improvement in the environments in which children are developing, it suggests that perhaps some of the more nuanced messages about different kinds of play and stimulation activities were not yet internalized by caregivers. Continued focus on these messages is necessary to fully achieve the desired outcomes of ECD programs. ECD programs should be designed and implemented as ongoing or cyclical, similar to other health services received by young children.

Training

- Data from training activities and session observation suggest that the supported cascade model used in this program was successful and should be used in future work. In addition, the facilitation techniques reinforced in the training activities seem to have supported good practice from frontline health workers and should be continued.
- Future trainings and parenting sessions should continue to include practice and demonstration of activities, as this was appreciated by both frontline health workers and caregivers.
- Future trainings should carefully consider the roles of CHPS staff and CHVs within target communities. Different cadres of frontline workers may be more appropriate to lead program delivery in different communities, as seen with this program. A collaboration between these groups is needed to fully support implementation activities.
- Future program implementation should also support training for supervisors within the CHPS system to help maintain quality of psychosocial stimulation message delivery. This includes training via the MCSP-created ECD eLearning modules.

Materials

- Toy-making activities met a need within communities and were greatly appreciated by caregivers and health workers. This practice should continue. One option for increasing the availability of toys for use during group sessions would be to hold a session specifically focused on making toys for the group. Caregivers can participate in making toys to be used as a group resource, and the toys can be kept in a small toy bank at the health facility.
- In addition, some budget for ECD should be included in the CHPS budget to facilitate the purchase of necessary materials or to replace worn or damaged training materials.
- The GHS and partners should consider collaborating with local book publishers to provide reading materials for ECD sessions. Such partnerships have been successful in other ECD programs throughout Africa.

Engaging Male Caregivers

- More specific targeting is needed for male caregivers. If male participation is low in group settings, finding other ways to reach fathers will be important (e.g., with home visits or through social media outlets). Male participation and contribution is critical both for improving their interactions with children and for facilitating mothers' attendance at sessions and behavior change in the home. Future programs could include mass sensitization and campaigns geared at changing attitudes of male caregivers.

Research and Evidence

- Future programs should incorporate causal research to better understand the impact of integrated ECD programs on children's healthy development in Ghana. This research could focus on questions of dosage and duration of ECD activities—how much input is to make significant improvements in caregiving behaviors and child development? To implement high-quality research design, these activities should be planned and budgeted from the start of program implementation.
- Strong, ongoing monitoring data should also be incorporated into future work, especially programs focused on scaling up services to help ensure quality.

Appendix A. Pre- and post-test scores (PY1/2)

Table A1. Pre- and post-test scores from PY1

	Eastern (n = 193)			Upper West (n = 202)		
	Pre-Test	Post-Test	Gain	Pre-Test	Post-Test	Gain
Early brain development	78%	88%	10%	72%	88%	16%
Early stimulation for children at different ages	75%	89%	14%	58%	79%	21%
Average overall score	77%	88%	12%	67%	85%	18%

Table A2. Pre- and post-test scores from PY2

	Eastern (n = 150)			Upper West (n = 378)		
	Pre-Test	Post-Test	Gain	Pre-Test	Post-Test	Gain
Early brain development	76%	87%	11%	77%	87%	10%
Early stimulation for children at different ages	78%	87%	9%	79%	86%	8%
Average overall score	73%	88%	15%	73%	87%	14%

Appendix B. Caregiver practice and environment data

Table B1. Attrition table

Region/District	Total Number at Baseline	Total Number Reached at Endline	Reasons for Attrition
Eastern Region, Upper West Akyem	120	86	Twelve participants from one community could not be located. The remaining had relocated to other parts of the country.
Upper West Region, Wa West	120	108	One caregiver was deceased, and the remaining had relocated to the southern part of Ghana because of the dry season for greener pastures.
Upper West Region, Sissala West	120	89	Two children ages 0–3 had died, so their parents were not contacted. The remaining had traveled due to the dry season and also because it was a market day in other communities.
TOTAL	**360**	**283**	

Table B2. Family household possessions by region

	Baseline			Endline		
	Eastern	Upper West	Significant Difference	Eastern	Upper West	Significant Difference
	n = 70	n = 183		n = 70	n = 183	
Radio	64%	56%		47%	50%	
Television	80%	36%	***	66%	42%	***
Refrigerator	24%	8%	***	26%	8%	***
Bicycle	11%	58%	***	9%	53%	***
Motorbike	13%	60%	***	19%	61%	***
Mobile phone	93%	85%		91%	90%	
Electricity	94%	62%	***	93%	64%	***
Land	71%	99%	***	86%	95%	*
Livestock	60%	88%	***	73%	93%	***
Number of possessions (out of nine)	5.1	5.5		5.1	5.6	
Number of appliances (out of seven)	3.8	3.7		3.5	3.7	*

Note: *p < .05, **p < .01, ***p < .001

Table B3. Breastfeeding and nutrition practices by region

	Baseline			Endline		
	Eastern	Upper West	Significant Difference	Eastern	Upper West	Significant Difference
	n = 70	n = 183		n = 70	n = 183	
Ever breastfed child	99%	100%		99%	99%	
Breastfed yesterday (child < 12 months)	94%	96%		94%	97%	
Drink from a bottle yesterday (child > 12 months)	6%	10%		0%	0	
Total food types eaten by child yesterday (child > 12 months)	3.1	3.9		3.8	3.1	
Acceptable dietary diversity (4+ food types) (child > 12 months)	35%	50%		41%	38%	
Grains	88%	81%		91%	82%	
Sweet potatoes, squash, carrots	6%	19%		3%	5%	
White potatoes, cassava, other roots	0%	15%	*	12%	5%	
Green, leafy vegetables	15%	44%	**	18%	37%	*
Mangos, papaya	0%	8%		6%	1%	
Other fruits and vegetables	3%	23%	**	21%	22%	
Organ meat (kidney, liver, etc.)	0%	5%		3%	1%	
Other meat (chicken, beef, pork, etc.)	9%	12%		6%	15%	
Eggs	9%	13%		21%	2%	***
Fresh or dried fish	18%	29%		44%	32%	
Beans, lentils, nuts	9%	11%		15%	15%	
Milk, yogurt, cheese	15%	8%		21%	11%	
Oils, fats, butter	29%	28%		47%	26%	*
Sugary foods/sweets	21%	23%		32%	28%	
Spices	26%	31%		35%	30%	
Grubs, snails, or insects	0%	1%		3%	0%	

Note: *p < .05, **p < .01, ***p < .001

Table B4. Reading materials and toys by region

	Baseline			Endline		
	Eastern	Upper West	Significant Difference	Eastern	Upper West	Significant Difference
	n = 70	n = 183		n = 70	n = 183	
Number of types of reading materials	1.7	0.9	**	2.7	2.1	
Number of storybooks	1.2	0.6	**	1.5	1.1	
Storybook	27%	15%	*	48%	38%	
Textbook	20%	10%	*	20%	30%	
Magazine	5%	3%		0%	1%	
Newspaper	3%	1%		3%	5%	
Religious	55%	27%	***	71%	53%	*
Coloring	6%	2%		24%	20%	
Comics	0%	0%		6%	2%	
Number of types of toys	2.0	1.8		3.2	3.2	
Homemade	15%	31%	*	52%	49%	
Store-bought	52%	35%	*	56%	55%	
Household objects	65%	59%		80%	76%	
Outdoor objects	53%	56%		79%	76%	
Drawing/writing	2%	2%		15%	14%	
Puzzle	0%	1%		0%	1%	
Hand-eye coordination	5%	1%	*	6%	6%	
Size/shape	3%	0%	*	9%	15%	
Numbers	2%	1%		14%	14%	

Note: *p < .05, **p < .01, ***p < .001

Table B5. Caregiving practices by region

	Eastern	Upper West	Significant Difference	Eastern	Upper West	Significant Difference
	n = 70	n = 183		n = 70	n = 183	
Number of stimulation/care activities in the past week (out of eight)	3.6	3.3		4.1	4.1	
Read	20%	13%		22%	30%	
Tell story	19%	27%		22%	31%	
Sing	79%	64%	*	75%	64%	
Take outside	59%	59%		71%	72%	
Play	43%	39%		65%	57%	
Draw/write	20%	19%		32%	51%	**
Teach	33%	35%		43%	53%	
Hug	90%	76%	*	81%	82%	
Time child spends in care of another child (hours per day)	1.1	1.6		2.0	2.2	
Time child spends alone (hours per day)	0.7	0.8		1.3	1.4	

Note: *p < .05, **p < .01

Appendix C. Caregiver Reported Early Development Instruments Assessment Data

Table C1. Caregiver Reported Early Development Instruments (CREDI) items and average scores[11]

	Baseline			Endline		
Variable	**Obs**	**Mean**	**Standard Deviation**	**Obs**	**Mean**	**Standard Deviation**
Children ages 0–5 months						
Does the child smile when others smile at him/her?	94	69%	0.46	-	-	-
Does the child grasp onto a small object (e.g., your finger, a spoon) when put in his/her hand?	94	59%	0.50	-	-	-
Does the child recognize you or other family members (e.g., smile when they enter a room or move toward them)?	95	48%	0.50	-	-	-
Does the child show interest in new objects by trying to put them in his/her mouth?	95	26%	0.44	-	-	-
When lying on his/her stomach, can the child hold his/her head and chest off the ground using only his/her hands and arms for support?	95	31%	0.46	-	-	-
Can the child pick up a small object (e.g., a small toy or small stone) using just one hand?	94	17%	0.38	-	-	-
When lying on his/her back, does the child grab his/her feet?	95	20%	0.40	-	-	-
Does the child look at an object when someone says "look!" and points to it?	95	12%	0.32	-	-	-
Does the child look for an object of interest when it is removed from sight or hidden?	94	15%	0.36	-	-	-
Does the child intentionally move or change his/her position to get objects that are out of reach?	94	16%	0.37	-	-	-
Does the child play by tapping an object on the ground or a table?	95	9%	0.29	-	-	-
Can the child hold him/herself in a sitting position without help or support for longer than a few seconds?	95	11%	0.31	-	-	-
Can the child pick up and eat small pieces of food with his/her fingers?	95	8%	0.28	-	-	-

[11] For blank cells, no children were 0–5 months at endline, so scores are not available. The items in this table are organized by difficulty/age group relevance.

	Baseline			Endline		
Variable	**Obs**	**Mean**	**Standard Deviation**	**Obs**	**Mean**	**Standard Deviation**
Can the child transfer a small object (e.g., a small toy or small stone) from one hand to the other?	95	7%	0.26	-	-	-
Can the child use gestures to indicate what he/she wants (e.g., put arms up to indicate that he/she wants to be held or point to water)?	94	5%	0.23	-	-	-
Can the child crawl, roll, or scoot forward on his/her own?	95	5%	0.22	-	-	-
Can the child throw a small ball or small stone in a forward direction using his/her hand?	95	1%	0.10	-	-	-
Can the child pick up and drop a small object (e.g., a small toy or small stone) into a bucket or bowl while sitting?	95	5%	0.22	-	-	-
Can the child say one or more words (e.g., names like "mama" or "ba" for "ball")?	95	2%	0.14	-	-	-
Can the child walk several steps while holding on to a person or object (e.g., wall or furniture)?	95	1%	0.10	-	-	-
Children ages 6–11 months						
Can the child pick up a small object (e.g., a small toy or small stone) using just one hand?	70	94%	0.23	53	100%	0.00
Does the child play by tapping an object on the ground or a table?	70	83%	0.38	53	89%	0.32
Does the child intentionally move or change his/her position to get objects that are out of reach?	70	87%	0.34	53	96%	0.19
Does the child look for an object of interest when it is removed from sight or hidden from him/her (e.g., put under a cover, behind another object)?	70	79%	0.41	53	92%	0.27
Can the child hold him/herself in a sitting position without help or support for longer than a few seconds?	70	91%	0.28	53	92%	0.27
Does the child look at an object when someone says "look!" and points to it?	79	86%	0.35	53	87%	0.34
Does the child look at an object when someone says "look!" and points to it?	79	84%	0.37	53	85%	0.36
Can the child crawl, roll, or scoot forward on his/her own?	79	76%	0.43	53	83%	0.38
Can the child transfer a small object (e.g., a small toy or small stone) from one hand to the other?	79	77%	0.42	52	90%	0.30
Can the child use gestures to indicate what he/she wants (e.g., put arms up to indicate that he/she wants to be held or point to water)?	79	46%	0.50	53	55%	0.50

	Baseline			Endline		
Variable	**Obs**	**Mean**	**Standard Deviation**	**Obs**	**Mean**	**Standard Deviation**
Can the child pick up and drop a small object (e.g., a small toy or small stone) into a bucket or bowl while sitting?	79	68%	0.47	53	62%	0.49
Can the child throw a small ball or small stone in a forward direction using his/her hand?	78	40%	0.49	53	53%	0.50
Can the child say one or more words (e.g., names like "mama" or "ba" for "ball")?	79	28%	0.45	53	19%	0.39
Does the child ask you for help using signs or words when he/she cannot do something on his/her own (e.g., to reach an object up high)?	70	13%	0.34	53	8%	0.27
Can the child walk several steps while holding on to a person or object (e.g., wall or furniture)?	79	20%	0.40	53	8%	0.27
Can the child follow simple directions (e.g., "Stand up" or "Come here")?	70	16%	0.37	53	13%	0.34
Can the child maintain a standing position on his/her own, without holding on or receiving support?	70	21%	0.41	53	25%	0.43
Can the child point to a person or object when asked (e.g., "Where is mama?" or "Where is the ball?")?	70	1%	0.12	53	2%	0.14
Can the child climb onto an object, such as a chair or bench?	70	21%	0.41	53	23%	0.42
Can the child kick a ball or other round object forward using his/her foot?	70	4%	0.20	53	8%	0.27
Children ages 12–17 months						
Can the child maintain a standing position on his/her own, without holding on or receiving support?	72	96%	0.20	46	91%	0.28
Can the child follow simple directions (e.g., "Stand up" or "Come here")?	72	97%	0.17	46	87%	0.34
Does the child imitate others' behaviors (e.g., washing hands or dishes)?	72	93%	0.26	46	78%	0.42
Can the child climb onto an object such as a chair or bench?	72	89%	0.32	46	87%	0.34
Is the child kind to younger children (e.g., speaks to them nicely and touches them gently)?	70	73%	0.45	46	78%	0.42
Does the child show curiosity to learn new things (e.g., by asking questions or exploring a new area)?	69	36%	0.48	46	48%	0.51
Can the child point to a person or object when asked (e.g., "Where is mama?" or "Where is the ball?")?	77	43%	0.50	46	35%	0.48
Can the child kick a ball or other round object forward using his/her foot?	72	53%	0.50	46	72%	0.46

	Baseline			Endline		
Variable	**Obs**	**Mean**	**Standard Deviation**	**Obs**	**Mean**	**Standard Deviation**
Does the child involve others in play (i.e., play interactive games with other children)?	72	82%	0.39	46	78%	0.42
Does the child show sympathy or look concerned when others are hurt or sad?	66	55%	0.50	46	65%	0.48
Can the child run more than a few steps without falling or bumping into objects?	72	51%	0.50	46	57%	0.50
Can the child throw a small ball or small stone in a forward direction using his/her hand?	77	70%	0.46	46	72%	0.46
Can the child stack three or more small objects (e.g., blocks, cups, bottle caps) on top of each other?	71	31%	0.47	46	48%	0.51
Can the child answer simple questions (e.g., "Do you want water?") by saying "yes" or "no," rather than nodding?	71	31%	0.47	46	20%	0.40
Does the child play by pretending objects are something else (e.g., imagining a bottle is a doll, a stone is a car, or a spoon is an airplane)?	71	23%	0.42	46	17%	0.38
Can the child correctly name at least one family member other than mom and dad (e.g., name of brother, sister, aunt, uncle)?	72	35%	0.48	46	28%	0.46
Can the child ask for something (e.g., food, water) by name when he/she wants it?	72	18%	0.39	46	26%	0.44
Can the child walk backward?	72	51%	0.50	46	46%	0.50
If you show the child an object he/she knows well (e.g., a cup or animal), can he/she consistently name it?	72	11%	0.32	46	13%	0.34
Can the child say 10 or more separate words (e.g., names like "mama" or objects like "ball")?	72	18%	0.39	46	17%	0.38
Children aged 18-23 months						
Can the child walk backward?	47	87%	0.34	55	95%	0.23
Can the child ask for something (e.g., food, water) by name when he/she wants it?	47	64%	0.49	55	87%	0.34
Can the child correctly name at least one family member other than mom and dad (e.g., name of brother, sister, aunt, uncle)?	47	77%	0.43	55	82%	0.39
If you show the child an object he/she knows well (e.g., a cup or animal), can he/she consistently name it?	47	53%	0.50	55	71%	0.46
Can the child remove an item of clothing (e.g., take off his/her shirt)?	47	55%	0.50	55	71%	0.46

	Baseline			Endline		
Variable	**Obs**	**Mean**	**Standard Deviation**	**Obs**	**Mean**	**Standard Deviation**
Can the child say 10 or more separate words (e.g., names like "mama" or objects like "ball")?	52	60%	0.50	55	76%	0.43
Can the child tell you when he/she is tired or hungry?	47	43%	0.50	55	49%	0.50
Can the child sing a short song or repeat parts of a rhyme from memory by him/herself?	47	43%	0.50	55	60%	0.49
Can the child jump with both feet leaving the ground?	47	68%	0.47	55	82%	0.39
Can the child correctly use any of the words I, you, she, or he (e.g., "I go to store" or "He eats rice")?	47	21%	0.41	55	18%	0.39
Can the child correctly ask questions using any of the words what, which, where, or who?	47	13%	0.34	55	15%	0.36
Can the child count up to five objects (e.g., fingers, people)?	47	19%	0.40	55	13%	0.34
Can the child speak using sentences of three or more words that go together (e.g., "I want water" or "The house is big")?	47	34%	0.48	55	40%	0.49
If you show the child two objects or people of different size, can he/she tell you which one is the big one and which is the small one?	46	22%	0.42	54	24%	0.43
Can the child identify at least one color (e.g., red, blue, yellow)?	47	9%	0.28	54	20%	0.41
Can the child explain in words what common objects like a cup or chair are used for?	47	21%	0.41	54	4%	0.19
If you ask the child to give you three objects (e.g., stones, beans), does the child give you the correct amount?	47	15%	0.36	55	13%	0.34
If you point to an object, can the child correctly use the words on, in, or under to describe where it is (e.g., "The cup is on the table" instead of "The cup is in the table.").	47	28%	0.45	55	4%	0.19
Does the child ask about familiar people other than parents when they are not there (e.g., "Where is the neighbor?")?	47	17%	0.38	55	25%	0.44
Does the child ask "why" questions (e.g., "Why are you tall?")?	47	9%	0.28	55	2%	0.13
Children ages 24–29 months						
If you show the child an object he/she knows well (e.g., a cup or animal), can he/she consistently name it?	31	87%	0.34	42	90%	0.30
Can the child say 10 or more separate words (e.g., names like "mama" or objects like "ball")?	31	68%	0.48	42	95%	0.22

	Baseline			Endline		
Variable	Obs	Mean	Standard Deviation	Obs	Mean	Standard Deviation
Can the child sing a short song or repeat parts of a rhyme from memory by him/herself?	31	71%	0.46	42	79%	0.42
Can the child jump with both feet leaving the ground?	31	97%	0.18	42	98%	0.15
Can the child speak using sentences of three or more words that go together (e.g., "I want water" or "The house is big")?	31	71%	0.46	42	88%	0.33
Can the child correctly ask questions using any of the words what, which, where, or who?	32	50%	0.51	42	71%	0.46
Can the child correctly use any of the words I, you, she, or he (e.g., "I go to store" or "He eats rice")?	32	47%	0.51	42	64%	0.48
Does the child ask about familiar people other than parents when they are not there (e.g., "Where is the neighbor?")?	32	44%	0.50	42	62%	0.49
Can the child count up to five objects (e.g., fingers, people)?	32	22%	0.42	42	60%	0.50
Can the child identify at least one color (e.g., red, blue, yellow)?	31	19%	0.40	42	36%	0.48
Does the child often kick, bite, or hit other children or adults?	31	48%	0.51	42	29%	0.46
If you show the child two objects or people of different size, can he/she tell you which one is the big one and which is the small one?	32	28%	0.46	41	59%	0.50
Does the child become extremely withdrawn or shy in new situations?	31	48%	0.51	42	55%	0.50
If you point to an object, can the child correctly use the words on, in, or under to describe where it is (e.g., "The cup is on the table" instead of "The cup is in the table.").	31	29%	0.46	42	36%	0.48
Does the child ask "why" questions (e.g., "Why are you tall?")?	32	22%	0.42	42	36%	0.48
If you ask the child to give you three objects (e.g., stones, beans), does the child give you the correct amount?	31	13%	0.34	42	45%	0.50
Can the child explain in words what common objects like a cup or chair are used for?	32	25%	0.44	42	45%	0.50
Can the child dress him/herself (e.g., put on his/her pants and shirt without help)?	31	35%	0.49	42	62%	0.49
Can the child say what others like or dislike (e.g., "Mama doesn't like fruit," "Papa likes football")?	31	29%	0.46	42	33%	0.48
Can the child talk about things that have happened in the past using correct language (e.g., "Yesterday I played with	31	13%	0.34	42	36%	0.48

	Baseline			Endline		
Variable	**Obs**	**Mean**	**Standard Deviation**	**Obs**	**Mean**	**Standard Deviation**
my friend" or "Last week she went to the market")?						
Children ages 30–35 months						
Can the child say 10 or more separate words (e.g., names like "mama" or objects like "ball")?	25	84%	0.37	51	100%	0.00
Can the child jump with both feet leaving the ground?	24	96%	0.20	51	98%	0.14
Can the child speak using sentences of three or more words that go together (e.g., "I want water" or "The house is big")?	24	79%	0.41	51	90%	0.30
Can the child sing a short song or repeat parts of a rhyme from memory by him/herself?	24	83%	0.38	51	100%	0.00
Can the child correctly ask questions using any of the words what, which, where, or who?	24	83%	0.38	51	94%	0.24
Does the child ask about familiar people other than parents when they are not there (e.g., "Where is the neighbor?")?	27	81%	0.40	51	94%	0.24
Can the child correctly use any of the words I, you, she, or he (e.g., "I go to store," or "He eats rice")?	27	52%	0.51	51	82%	0.39
Can the child count up to five objects (e.g., fingers, people)?	27	63%	0.49	51	88%	0.33
Can the child identify at least one color (e.g., red, blue, yellow)?	27	44%	0.51	51	55%	0.50
If you show the child two objects or people of different size, can he/she tell you which one is the big one and which is the small one?	27	67%	0.48	51	86%	0.35
If you point to an object, can the child correctly use the words on, in, or under to describe where it is (e.g., "The cup is on the table" instead of "The cup is in the table.")	27	81%	0.40	51	76%	0.43
Can the child explain in words what common objects like a cup or chair are used for?	27	67%	0.48	51	80%	0.40
Can the child dress him/herself (e.g., put on his/her pants and shirt without help)?	27	74%	0.45	51	80%	0.40
Does the child ask "why" questions (e.g., "Why are you tall?")?	27	48%	0.51	51	51%	0.50
If you ask the child to give you three objects (e.g., stones, beans), does the child give you the correct amount?	27	52%	0.51	51	65%	0.48
Does the child often kick, bite, or hit other children or adults?	27	26%	0.45	51	33%	0.48

	Baseline			Endline		
Variable	**Obs**	**Mean**	**Standard Deviation**	**Obs**	**Mean**	**Standard Deviation**
Does the child become extremely withdrawn or shy in new situations?	27	52%	0.51	51	69%	0.47
Does the child frequently act impulsively or without thinking (e.g., running into the street without looking)?	24	67%	0.48	50	58%	0.50
Can the child say what others like or dislike (e.g., "Mama doesn't like fruit," "Papa likes football")?	27	48%	0.51	51	45%	0.50
Can the child talk about things that have happened in the past using correct language (e.g., "Yesterday I played with my friend" or "Last week she went to the market")?	27	52%	0.51	51	63%	0.49

Table C2. Multivariate regression results

Variables	Endline CREDI scores (std)
Child age in months	3.008***
	(0.273)
Child age (squared)	-0.083***
	(0.012)
Child age (cubic)	0.001***
	(0.001)
Child is female	0.369
	(0.301)
Region is Upper West	-0.330
	(0.363)
Number of reading materials	0.114~
	(0.0613)
Number of caregiving practices	0.178**
	(0.068)
Socioeconomic status	0.006
	(0.259)
Child has an acceptable dietary diversity	0.143
	(0.321)
Constant	18.45***
	(1.859)
Observations	247
R-squared	0.903
Robust standard errors in parentheses	

*** p<0.001, ** p<0.01, * p<0.05, ~ p<0.1