



**EVALUATION OF THE FEASIBILITY AND EFFECTIVENESS  
OF A HEALTH FACILITY-BASED EARLY CHILDHOOD  
DEVELOPMENT (ECD) INTERVENTION IN  
SIAYA COUNTY, KENYA**

**SUMMARY REPORT | DECEMBER 2021**





## TABLE OF CONTENTS

<b>Executive Summary</b>	<b>2</b>
<b>1 Introduction</b>	<b>4</b>
<b>2 Methods</b>	<b>5</b>
2.1 Study site and design	5
2.2 Study participants and data collection	6
2.3 Outcome measures	6
2.4 Data analysis	6
2.5 Feasibility and acceptability study	6
2.6 Cost-effectiveness study	6
<b>3 Results</b>	<b>7</b>
3.1 Feasibility and acceptability results	7
3.1.1 Feasibility of the intervention	7
3.1.2 Acceptability of the ECD intervention	8
3.1.3 Sustainability of the ECD intervention	8
3.2 Impact evaluation results	11
3.2.1 Baseline characteristics	11
3.2.2 Fidelity of implementation	12
3.2.3 Caregiver knowledge scores	12
3.2.4 Caregiver ECD practices scores	13
3.2.5 Children's ASQ-3 scores	14
3.3 Cost-effectiveness analysis results	14
<b>4 Discussion</b>	<b>15</b>
<b>5 Conclusions and Recommendations</b>	<b>16</b>
5.1 Conclusions	16
5.2 Recommendations	16

# Executive Summary

Globally, child survival has improved considerably due to better socioeconomic conditions, health systems and access to health services. However, a large proportion of children remain at risk of not achieving their developmental potential due to poor nutrition, poor health, limited access to services and inadequate resources, all exacerbated by poverty. Majority of these children live in sub-Saharan Africa. PATH worked with the Ministry of Health (MoH) in Siaya County, Kenya, to integrate early childhood development (ECD) content into the health system services.

The African Population and Health Research Center (APHRC) evaluated the PATH-supported model for its feasibility, acceptability, and effectiveness. Feasibility and acceptability were assessed using qualitative approaches. The effectiveness results are based on panel data of caregivers who completed the baseline and endline surveys. The effectiveness study was designed as a three-armed cluster-randomized controlled trial (c-RCT). Public health facilities were randomly selected from each of the six wards and stratified at the ward level. Eighteen health facilities were randomized to the three study arms (health facility-based ECD intervention [HF], health facility-plus home-based ECD intervention [HF+home] and control) with six in each arm. Caregivers and their young children were followed up from pregnancy until the children were aged between 24 and 27 months. The study recruited 792 pregnant women in their third trimester and followed up primary caregiver-child dyads at the second baseline (Post-Birth 1 when children were aged 1-2 months), midline (Post-Birth 2 when children were aged 9-10 months) and endline (Post-Birth 4 when children were aged 24-27 months). The cost-effectiveness evaluations of the ECD interventions were conducted from the government-funded healthcare perspective.

The results from the feasibility study revealed that the intervention performed well in terms of providing childcare knowledge and information on stimulation and play activities to the beneficiaries. With regards to service provision, caregivers reported that they had benefitted from services on nutritional counseling, stimulation, and early learning, sensitivity and responsive caregiving, positive discipline, child health, as well as monitoring of developmental outcomes of young children. Major barriers that were reported included high healthcare staff workloads, staff transfers, lack of commitment, lack of resources, community resistance, and poor male involvement. Facilitators included a supportive health system, availability of reference materials, good coordination and capacity building of various stakeholders, a well-organized community structure, political goodwill, and buy-in of stakeholders. Participants reported that they were generally satisfied with the intervention. They supported the intervention in various ways including through provision of play materials, facilitating health talks, providing on-the-job and supportive supervision. Perceived benefits included more responsiveness to children's needs, timely identification of developmental delays, increased health facility visits and timely referrals. Sustainability factors included leveraging the existing health system, involvement of community members, existing structures, provision of training and supervision by healthcare providers, and spearheading of implementation by the county government.

With regards to the impact study, out of the 792 caregivers interviewed at baseline, 418 attended all the subsequent surveys. A total of 616 caregivers were interviewed at both baseline (for caregivers; Pre-Birth) and endline (Post-Birth 4) while 481 caregivers were interviewed at both baseline (for children; Post-Birth 1) and endline (Post-Birth 4). There were no socio-demographic group differences at baseline. Generally, there seemed to be a positive change within arms in the intervention arms for all the outcomes from baseline to endline, but (apart from the caregiver practice scores), there did not seem to be a significant change from baseline to endline in the control arm.

Based on the panel data, at Pre-Birth, participants in the control arm had higher knowledge scores than those in the intervention arms. At Post-Birth 1, caregivers in the control arm had slightly higher child stimulation practice scores than those in the HF+home arm. Children's ASQ-3 scores were higher for those in the control arm than those in both intervention arms at baseline (Post-Birth 1 when children were aged 1-2 months). At endline (Post-Birth 4 when children were aged 24-27 months) the knowledge and practice scores for participants in the intervention arms were higher than those for the control arm while children's ASQ scores were similar across the



three arms. At midline (Post-Birth 2 when children were aged 9-10 months), the main impact results showed that caregiver practices scores were 0.69 SD and 0.68 SD higher for the HF and HF+home arms, respectively, compared with the control. Children in the two intervention arms had significantly higher ASQ-3 scores. The results at endline (when children were aged 24-27 months) showed no statistically significant impact of the intervention on caregiver or child outcomes.

From the costing study, the HF arm was the most affordable strategy at midline, showing the lowest cost-effectiveness ratios at US\$3.34, US\$1.26, and US\$1.55 for knowledge, practices, and ASQ scores, respectively. The positive and significant effects observed at the midline seemed to have vanished at the endline evaluation.

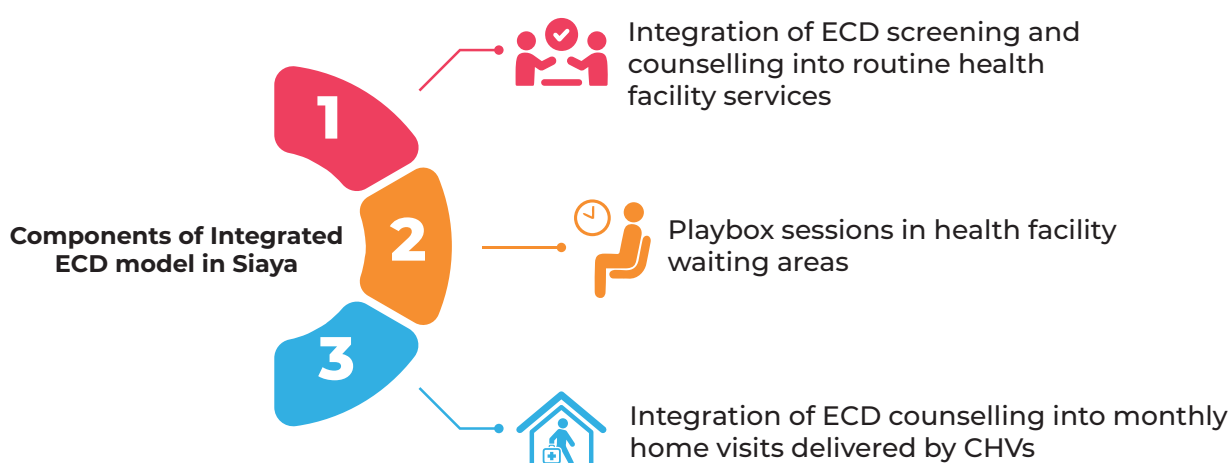
In conclusion, the results from the feasibility study indicated that despite the barriers and challenges, integrating ECD messages into the health systems is feasible with regards to performance, usefulness, uptake, and efficiency in service provision. Our findings from the impact study showed expected and unexpected trends. Whereas at midline the intervention arms had significantly higher scores than the control arm, at the endline, the intervention was not effective in improving caregiver and child outcomes. Further research, with the investigation of possible confounders, is needed to determine other factors that influence the effectiveness and cost-effectiveness of the interventions.

# 1 INTRODUCTION

Recent studies have shown that over 250 million children in low- and middle-income countries (LMICs) are at risk of not achieving their developmental potential. The risks, which are exacerbated by poverty, are associated with poor health and nutrition, high prevalence of HIV, and home environments with limited or no stimulation. Although countries like Kenya have made tremendous strides in improving the lives and prospects of young children (e.g. reduced malnutrition rates, decreased child mortality rates and increased access to basic education), there remains much to be done. In Kenya, children remain disproportionately represented among the poor and vulnerable, with 41.5% of children living below the national poverty line<sup>1</sup>. In addition, 38.3% of children aged three to four years are not achieving their cognitive and socioemotional milestones, and the youngest, the poor and the marginalized are the most likely to be left behind<sup>2</sup>.

One of the key recommendations from the 2016 Lancet Early Childhood Development (ECD) Series was routine maternal and child health (MCH) and nutrition services to expand their scope by integrating ECD content. Regarding the view that routine health and nutrition services are often the only means to consistently reach children and their caregivers in LMICs, PATH worked with the Ministry of Health (MoH) in Siaya County to integrate ECD content into the health system services.

PATH's integrated ECD model in Siaya had the following components: 1) Integration of ECD screening and counselling for developmental milestones and light-touch nutrition counselling in routine health facility clinical services (e.g. maternity, postnatal care, and growth monitoring and immunization) by clinical service providers such as nurses and clinical officers. Health service providers integrated ECD counselling into the following touch points that form part of the National Immunization Schedule in Kenya: Immunizations given at birth or shortly after birth or postnatal care visit; 6-week immunisation visit; 10-week immunisation visit; 14-week immunization visit; 6-month vitamin A supplementation visit; and 9-month immunization visit. After the 9-month immunization visit, caregivers continue to receive ECD counselling any time they present at the health facility for growth monitoring or other visits; 2) Playbox sessions in health facility waiting areas led by community health volunteers (CHVs) in order to make these spaces more child-friendly and integrate ECD counselling into lengthy wait-times; 3) Integration of ECD counselling into monthly home visits delivered by CHVs. Components 1 and 2 are collectively referred to as the health facility-based (HF) ECD intervention within this report, while component 3 is referred to as the home-based ECD intervention. Of note is that at the onset of the COVID-19 pandemic, the duration of time that caregivers spent with healthcare providers reduced, and the playbox sessions ceased. Further, at the time of the endline (Post-Birth 4) data collection round towards the end of 2020, nurturing care had been institutionalized within the County healthcare system, and all the top managers and service providers had been trained on this at the end of 2019/ beginning of 2020. At the time, there was an intensive sensitization campaign to promote the delivery of the nurturing care intervention across the entire County.



<sup>1</sup> UNICEF. (2018). Looking back, moving forward. Impact Report 2014-2018.

<sup>2</sup> Bouchane, K., Curtiss, M. (2016). Early Childhood Development in Kenya – Giving Every Child the Best Start in Life. Theirworld and KANCO.

The African Population and Health Research Center (APHRC) evaluated PATH's model to:

- 1 Assess key feasibility and operational issues associated with the integration of the ECD messages into the health systems;
- 2 Determine its effectiveness in terms of improvements in mother/caregiver ECD knowledge and practices, as well as child growth and developmental outcomes; and,
- 3 Estimate costs and investigate the cost-effectiveness of the intervention from the government-funded health systems perspective.

## 2 METHODS

### 2.1 Study site and design

The study was conducted in Bondo sub-County in Siaya County, Western Kenya, where PATH supported the MoH to integrate ECD into the routine facility- and home-based health services in five sub-counties. The three-armed, cluster-randomized controlled trial used a mixed-methods approach combining both quantitative and qualitative data collection methods and was conducted between May 2018 and November 2020. Mother/caregiver-child dyads in **Arm 1** only received the HF ECD intervention which comprised components 1 and 2. They were also exposed to monthly CHV home visits which did not include ECD counselling. Mother/caregiver-child dyads in **Arm 2** were exposed to the three intervention components, that is, the HF ECD intervention plus ECD counseling during monthly home visits (HF+home) by the CHVs. Mother/caregiver-child dyads in **Arm 3** (control) only received the current Ministry of Health's standard care.

### 2.2 Study participants and data collection

Consecutive sampling was used to recruit women in their third trimester of pregnancy. The women were first interviewed at baseline (Pre-Birth) during the routine antenatal clinic (ANC) visits to the sampled health facilities between May and August 2018. After delivery, these mothers were followed up with their children, and data were collected at three time points as shown in Table 1. The study recruited 792 pregnant women at baseline (Pre-Birth) and followed up 570, 610, and 640 mother/ caregiver-child dyads at the second baseline (Post-Birth 1), midline (Post-Birth 2), and endline (Post-Birth 4) data collection rounds, respectively.

*Table 1. Data collection time points and number of participants at each point*

Data collection dates	Number of participants	Time point	Child age
May to August 2018	792 pregnant women	Caregivers' baseline or T0 (Pre-Birth)	-
September to December 2018	570 caregiver-child dyads	Children's baseline or T1 (Post-Birth 1)	1 -2 months
May to August 2019	610 caregiver-child dyads	Midline or T2 (Post-Birth 2)	9-10 months
October to November 2020	640 caregiver-child dyads	Endline or T4 (Post-Birth 4)	24-27 months

Implementation of the intervention was affected by the restrictions imposed in the country when the first COVID-19 case was reported in March 2020 and had to be scaled down. Further, the endline survey round was undertaken when implementation was affected by the restrictions

## 2.3 Outcome measures

Caregivers' ECD knowledge and child-rearing practices were quantified using a standard set of questions regarding each construct. Higher summated scores signified better caregiver ECD knowledge and practices. Children's developmental outcomes were measured using age-specific child development indicators based on the Ages and Stages Questionnaire – Third Edition (ASQ-3) at baseline and midline, and the ASQ: Inventory (ASQ: I) at endline. We administered the ASQ-3 and ASQ: I through a combination of caregiver-self-reported questions and direct observations. To establish the impact of COVID-19 on implementation activities, the implementation team conducted exit interviews with caregivers from all three study arms at 17 out of 18 health facilities between August and December 2020 focusing on exposure to the domains of nurturing care for ECD (NCFECD).

## 2.4 Data analysis

Our effectiveness results are based on panel data of caregivers who completed the baseline (Pre-Birth for ECD knowledge outcome; Post-Birth 1 for ECD practices and ASQ outcomes) and endline (Post-Birth 4) surveys. We estimated the treatment on the treated (TOT) effect, that is, the impact of the exposure on caregivers who received the intervention. Analysis of covariance (ANCOVA) was conducted to compare the effectiveness of the two interventions<sup>3</sup>. All models were adjusted for caregiver age, caregiver education, caregiver occupation, marital status, parity, number of health facility visits, and income. Additionally, the ASQ model was adjusted for age and nutritional status.

## 2.5 Feasibility and acceptability study

Feasibility and acceptability were assessed qualitatively. Participants were selected purposively and included female and male caregivers, CHVs, healthcare providers, members of the health management teams at the County and sub-County levels, as well as PATH's project staff. The study team conducted in-depth interviews (IDIs) with primary caregivers, focus group discussions (FGDs) with CHVs and fathers, and key informant interviews (KIIs) with PATH implementing staff and members of the County and sub-County Health Management Teams (S/CHMT). The study team generated themes based on the objectives and the research questions and grouped them under three major areas: feasibility, acceptability, and sustainability of the study. Similar questions were asked across different participant types to obtain deeper insights on the issues explored.

The cost-effectiveness evaluations of the studied ECD interventions were conducted from the government-funded health systems perspective. The data collected included start-up and implementation costs, and recurrent costs needed to execute the interventions. The incremental financial and economic costs of the studied interventions were estimated as the total of the recurrent and capital costs. Unit economic costs of the interventions per caregiver/child dyad were estimated and incremental cost-effectiveness ratios were calculated.

## 2.6 Cost-effectiveness study

The cost-effectiveness evaluations of the studied ECD interventions were conducted from the government-funded health systems' perspective. The data collected included start-up and implementation costs, and recurrent costs needed to execute the interventions. The incremental financial and economic costs of the studied interventions were estimated as the total of the recurrent and capital costs. Unit economic costs of the interventions per caregiver/child dyad were estimated and incremental cost-effectiveness ratios were calculated.

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<sup>3</sup> Comparisons were made between the control arm and each of the two treatment arms using OLS for continuous variables and Probit for binary variables considering block randomization and clustering effects at the health facility.

## 3 RESULTS

### 3.1 Feasibility and acceptability results

Table 2 provides a synthesis of some of the findings from the feasibility and acceptability study which are highlighted in the section that follows.

#### 3.1.1 Feasibility of the intervention

##### ■ Performance of the intervention

The feasibility study revealed that the intervention performed well in terms of providing childcare knowledge and information on stimulation and play activities to the beneficiaries. Caregivers mentioned that the intervention improved their childcare skills by providing them with opportunities to learn new information regarding children's care and development. In addition, they were taught to support their children's development through play activities, making toys for them from locally available materials, encouraging their children to play with their peers, and playing with them. Also, the healthcare providers and CHVs encouraged them to be responsive to the child's needs, and engage their children in play activities and also allow them to play with other children. For CHVs, the intervention improved their knowledge of childcare, and the new information they had obtained was useful to their work. The CHVs also indicated having greater awareness of the importance of play to young children and that siblings had a very important role to play in the stimulation of young children. Similarly, healthcare providers indicated that they had received very important information on childcare, growth, and development, which were not readily available to them, including during their preservice training. They added that they were able to identify developmental delays, something that they could not do before, and that they had become keener on directing caregivers to the nurturing care messages included in the mother-child booklet.

##### ■ Efficiency of service provision and information provided

With regards to service provision, caregivers reported that they had benefitted from services on nutritional counseling, stimulation, and early learning, sensitivity and responsive caregiving, positive discipline, child health, as well as monitoring of developmental outcomes of young children. Further, the caregivers reported that the services offered at the facility were accessible and affordable and that they were satisfied with the quality of service delivery that they received. In terms of information, the caregivers mentioned that the messages from the healthcare providers and the CHVs were useful and helped improve their caregiving skills. CHVs, healthcare workers, and health managers found the training useful.

##### ■ Perceived barriers and facilitators

Facilitators included a supportive health system, availability of reference materials such as mother-child booklets, good coordination and capacity building of various stakeholders, a well-organized community structure, political goodwill, and buy-in of stakeholders. Major barriers that were reported at the facility, community and county levels, as well as from the project implementer's perspective included high healthcare staff workloads, staff transfers, lack of commitment, and lack of resources, community resistance, and poor male involvement.

## 3.1.2 Acceptability of the ECD intervention

### ■ Satisfaction with implementation

Caregivers reported that they were satisfied with the integration of nurturing care messages during service delivery within the health facilities; long waiting times, which were associated with low user satisfaction had become more bearable as children were occupied with play activities. In addition, children seemed to be more interested in coming to the health facility due to the availability of play corners. Healthcare workers felt that caregivers had embraced the intervention and appreciated the information they received. In addition, caregivers had positive perceptions of the intervention and they seemed to appreciate the services they received from healthcare providers. CHVs seemed to be satisfied with the intervention and noted that the community members had embraced the program and with the awareness that play materials could be made from locally available items, they were willing to engage in the different play activities. CHVs also indicated that they were motivated to continue with the program, as they were the ones tasked with playing with children and educating caregivers.

### ■ Forms of support

Caregivers reported donating play items, facilitated health talks, and supported the replenishment and storage of the play materials. The CHVs made play items, taught caregivers how to make play items, and supported the establishment of play corners. The healthcare providers mentioned that

they supported the intervention through conducting play box sessions, taught caregivers how to make play items, provided IEC materials for reference during counseling, supported the establishment of play corners and ensured the security of play boxes, and provided on-the-job training for new staff. They also provided supervision and mentorship of trained CHVs. The health management team provided capacity building, support supervision, and mentorship as well as on-the-job training for health facility staff and the CHVs. This was in addition to being the trainers of the trainers.

### ■ Perceived benefits

Caregivers reported that the delivery of the intervention had improved their children's feelings towards the health facility visits and they were occupied during waiting periods. The intervention seemed to have enhanced their ability to detect delayed milestones. Male caregivers reported that they had learned the importance of play. Further, caregivers were more responsive to children's needs. CHVs reported that they had become more adept at identifying age-appropriate play materials, and learned about the importance of timely identification of developmental delays. They stated that the intervention had led to increased referrals and greater male involvement. In relation to the benefits of the intervention, healthcare professionals mentioned that the play box sessions seemed to have enhanced children's optimal development, and there was an increase in facility visits as well as timely referrals, and early identification of developmental delays.

## 3.1.3 Sustainability of the ECD intervention

As the intervention leveraged the existing health system, both the users and the providers perceived that it was likely to be sustainable. In addition, the use of locally available materials and engagement of local community members would enhance its sustainability. With the sustained supply of play materials by the caregivers, continued support for making play materials, and replenishment of play materials by the CHVs, the implementation would continue as it was perceived to be cost-efficient. The training that healthcare providers received provided them with knowledge that would help with the progression of intervention activities. Involvement of community members, existing structures, and provision of training and supervision by healthcare providers would enhance sustainability. Further, spearheading of implementation by the county government was a key factor to enhance sustainability. Adaptation considerations included change of language used for the IEC materials and the tailoring the training to the level of the different types of participants. Scaling of the intervention was perceived to be possible, as other counties had expressed interest.



Table 2. Synthesis of key findings under each theme and sub-theme (rows) and by respondent type (columns)

	Caregivers	CHVs	Healthcare providers	S/CHMT members (Policy makers and policy implementers)	Project implementers
<b>Feasibility</b>	<ul style="list-style-type: none"> <li>Encouragement from health service providers to be responsive to children's needs</li> <li>ECD counselling enhanced care of young children</li> <li>Messages received considered useful and play corners reduced burden of long waiting periods</li> </ul>	<ul style="list-style-type: none"> <li>Improved knowledge of childcare and greater awareness on importance of play</li> <li>Encouraged caregivers to make play items using locally-available materials</li> <li>Nurturing care content enabled CHVs to do their work of appropriate counselling and referrals more easily and effectively</li> </ul>	<ul style="list-style-type: none"> <li>More keen on directing caregivers to nurturing care messages in MCH booklet</li> <li>Counselling aids enhanced ECD counselling and playbox session provided practical experience</li> <li>Counselling cards facilitated home visits and training enhanced CHVs knowledge of nurturing care</li> </ul>	<ul style="list-style-type: none"> <li>Cascaded training and supervision from top to bottom levels</li> <li>Perceived CHVs as knowledgeable and effective in integrating ECD counselling in home visits</li> <li>CHVs well equipped to carry out their duties well and better able to make referrals</li> </ul>	<ul style="list-style-type: none"> <li>Strengthened existing structures</li> <li>Satisfactory facility coverage</li> <li>Robust service delivery system</li> </ul>
<b>Acceptability</b>	<ul style="list-style-type: none"> <li>Reported benefits of intervention and more interest by male caregivers</li> <li>Donated and replenished play items</li> </ul>	<ul style="list-style-type: none"> <li>Community members willing and motivated to engage with activities</li> <li>Ensured availability of play items</li> </ul>	<ul style="list-style-type: none"> <li>Reported positive perceptions by caregivers and motivated about implementation</li> <li>Provision of on-the-job training for new staff</li> <li>Supervision and mentorship of trained CHVs</li> </ul>	<ul style="list-style-type: none"> <li>Satisfaction with training received, and technical support</li> <li>Capacity building, on-the-job training, support supervision and mentorship</li> </ul>	<ul style="list-style-type: none"> <li>Receptiveness of county and sub-county staff</li> <li>Training, mentorship and provision of IEC materials</li> </ul>



	Caregivers	CHVs	Healthcare providers	S/CHMT members (Policy makers and policy implementers)	Project implementers
<b>Sustainability</b>	<ul style="list-style-type: none"> <li>● Sustained supply of play materials</li> <li>● Inclusion of other members of the household</li> <li>● Community sensitization on intervention</li> </ul>	<ul style="list-style-type: none"> <li>● Intervention perceived to be cost-effective</li> <li>● Inclusion of other stakeholders would enhance sustainability</li> <li>● Extension of program to household level</li> </ul>	<ul style="list-style-type: none"> <li>● Perceived intervention to be cost-effective</li> <li>● On-the-job training for new staff</li> <li>● Translation of materials to local language</li> </ul>	<ul style="list-style-type: none"> <li>● Community involvement and stakeholder co-ordination and collaboration enhanced sustainability</li> <li>● Inclusion of module on how to handle children with special needs, preterm babies</li> </ul>	<ul style="list-style-type: none"> <li>● Spearheading of implementation by county government</li> <li>● Adaptation of training manual and counselling materials to suit local context</li> <li>● County to facilitate, budget and plan for implementation</li> </ul>

## 3.2 Impact evaluation results

### 3.2.1 Baseline characteristics

Baseline characteristics were similar across arms except for number of children and household income. Caregivers in the HF arm had a significantly higher number of children than those in the control arm ( $p=0.048$ ). The monthly household income was significantly higher in the HF+home arm than in the control arm ( $p=0.002$ ) (Table 3). The attrition rate for the sample based on the knowledge outcome between Pre-Birth and Post-Birth 4 was 19.2% while that for the practices and ASQ-3 scores from Post-Birth 1 to Post-Birth 4 was 15.6%. For the main impact analysis, the panel data included 616 caregivers whose knowledge scores were compared between baseline (Pre-Birth) and endline (Post-Birth 4), and 481 caregivers whose ECD practices and children's ASQ-3 scores were compared between the second baseline (Post-Birth 1) and endline.

*Table 3. Description of sample characteristics at baseline*

	Description of the variables	Control arm	HF arm	p-value Control vs HF arm	HF+home arm	p-value Control vs HF+home arm
Caregiver and child outcomes						
Knowledge score	Mean knowledge score	7.24	6.60	0.092	6.79	0.201
Practice score	Mean practice score	3.46	3.49	0.921	3.44	0.954
ASQ-3 score	Mean ASQ-3 score	55.51	53.36	0.475	49.19	0.053
Sociodemographic characteristics						
Age (years)	Mean caregiver age	25.8	26.4	0.183	26.1	0.593
Education	Education of the caregivers, 1 for secondary education and above, 0 for primary and below	0.29	0.31	0.562	0.34	0.245
Occupation	Employment status of the caregiver, 1 if unemployed, 0 otherwise	0.51	0.51	0.945	0.48	0.602
Marital status	Marital status of the caregiver, 1 if married and 0 otherwise.	0.83	0.79	0.077	0.82	0.638
Number of children	Number of children under the caregiver	1.71	1.97	<b>0.048</b>	1.84	0.392
Log income	Income of the caregiver in logarithm	8.54	8.56	0.271	8.61	<b>0.002</b>
Child sex	Sex of child, 1 if child is female and 0 if male	0.52	0.52	0.971	0.51	0.753
<b>Observations</b>		<b>206</b>	<b>210</b>		<b>200</b>	

### 3.2.2 Fidelity of implementation

The average (median) number of health facility visits in the HF+home arm was seven, which was significantly higher than in the HF arm (n = 5). The median number of times that caregivers received ECD counselling at the health facility was two times significantly higher in the HF arm than in the HF+home arm.

The number of caregivers visiting the health facilities across all three arms reduced over time, with a decline seen after the fourth visit, and this was particularly sharp for those in the HF arm. The number of caregivers visiting the health facilities also dropped off towards the end of the study because of COVID-19 restrictions (Figure 1).

The results across the three study arms showed that the proportion of caregivers who reported that their children's height and weight measurements were taken during the visit was high and similar across the three arms. However, the proportion of caregivers who reported that the healthcare providers assessed if their children were developmentally on track, assessed child feeding practices, showed them how to play with their children and helped them to make a plan on play and communication was remarkably higher in the two intervention arms than in the control arm. The proportion of caregivers in the control arm who reported that healthcare providers spent less than five minutes with them was almost twice that of those in the intervention arms.

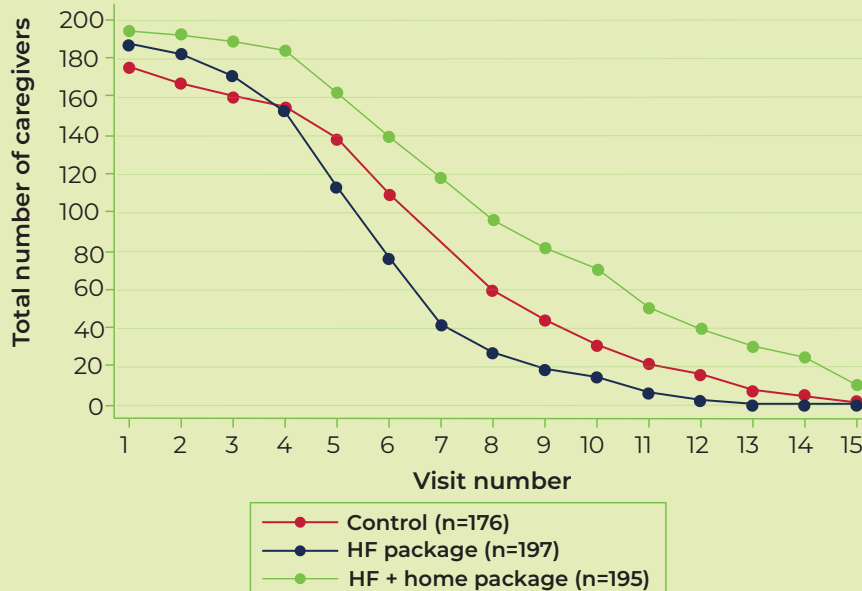


Figure 1. Total number of caregivers across 15 health facility visits

### 3.2.3 Caregiver knowledge scores

At baseline (Pre-Birth), caregivers in the control arm had higher knowledge scores than those in the HF and HF+home arms. At endline (Post-Birth 4), the caregivers in the HF and HF+home arms had higher knowledge scores than those in the control arm (Figure 2). There was a significant change from baseline to endline in the knowledge scores of caregivers in the intervention arms.

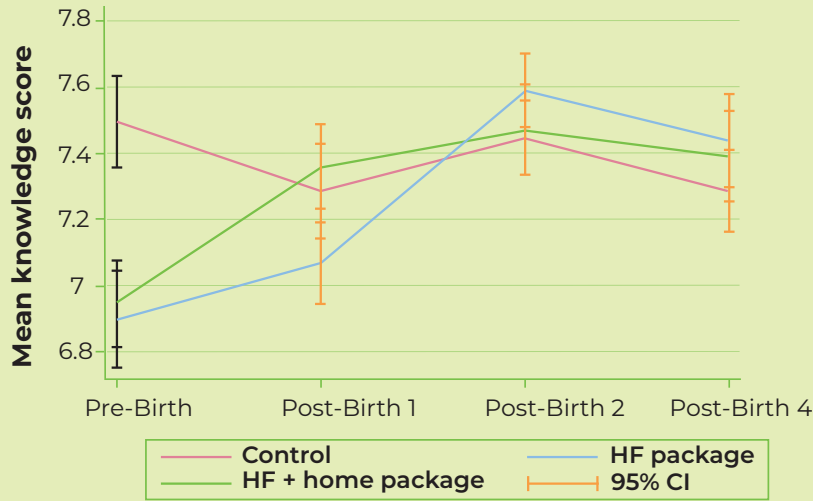


Figure 2. Mean ECD knowledge score by arm across survey rounds

The main impact results showed that at midline (Post-Birth 2, when children were aged 9-10 months), being exposed to the integrated ECD program at the health facility alone did not result in higher caregiver ECD knowledge scores compared to the control arm (adjusted effect size = 0.26; 95% CI: -0.01-0.53). There was also no significant difference in caregivers' ECD knowledge score among caregivers in the HF+home arm (adjusted effect size = 0.06 SD; 95% CI: -0.36-0.48) compared to the control group. The results at endline (Post-Birth 4) showed no statistically significant causal impact of the intervention on caregiver knowledge scores at a 95% level of confidence. Additional sensitivity analyses were conducted to account for attrition, including imputing missing values and factor analysis. However, these analyses did not result in changes in the findings and did not affect the main analytic approach.

### 3.2.4 Caregiver ECD practices scores

At the baseline for children (Post-Birth 1) when they were aged between one and two months, caregivers in the control arm had slightly higher practices scores than those in the HF+home arm. At endline (Post-Birth 4) when children were aged 24-27 months, caregivers in the intervention arms had higher scores than those in the control arm (Figure 3). The change in practices scores from baseline to endline was significant across all the study arms.

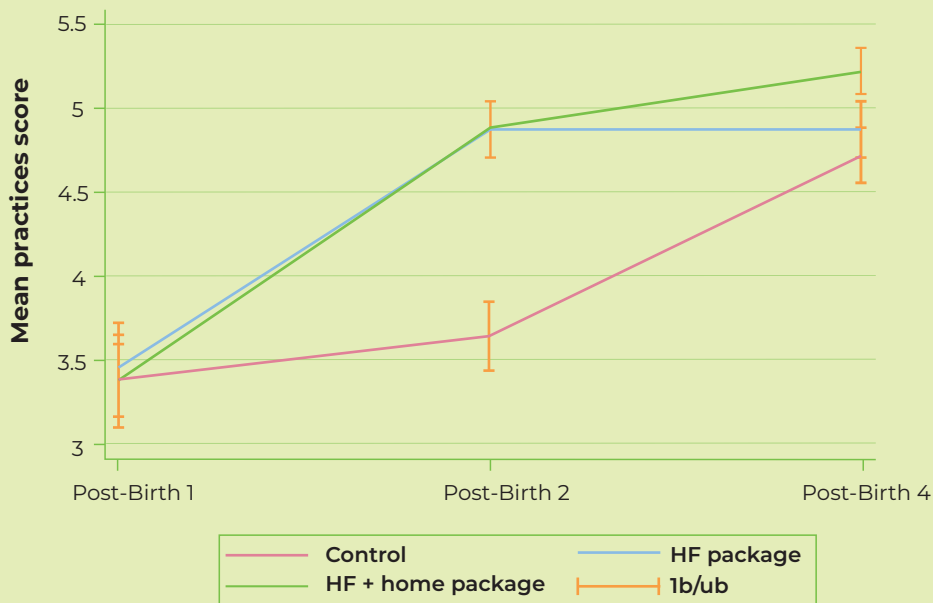


Figure 3. Mean ECD practices scores by arm across surveys

The impact analysis showed that at Post-Birth 2, caregiver practices scores were 0.69 SD and 0.68 SD significantly higher for the HF and HF+home treatment arms, respectively, compared with the control (HF arm: adjusted effect size = 0.69, 95% CI: 0.30-1.08; HF+home arm: adjusted effect size = 0.68, 95% CI: 0.23-1.14). At endline, the intervention did not seem to have a significant impact on caregiver ECD practices.

### 3.2.5 Children’s ASQ-3 scores

Children’s ASQ-3 scores were higher for those in the control arm than those in both intervention arms at baseline (Post-Birth 1). On the other hand, at endline, children’s ASQ scores were similar across the three arms. There was a significant change in scores from baseline to endline among children in the intervention arms. In the impact analysis, the results at midline (Post-Birth 2) showed that compared to the control arm, children in the two intervention arms had significantly higher ASQ-3 scores (HF arm: adjusted effect size = 0.75; 95% CI: 0.40-1.10; HF+home arm: adjusted effect size = 0.56; 95% CI: 0.05-1.08). At endline (Post-Birth 4), the results showed that the intervention had no significant impact on ASQ-3 domain scores.

## 3.3 Cost-effectiveness analysis results

Table 4 provides information on the unit costs of the intervention at midline and endline. The various cost-effectiveness calculations revealed that the HF arm was the most affordable strategy at midline, showing the lowest cost-effectiveness ratios at US\$3.34, US\$1.26, and US\$1.55 for knowledge, practices, and ASQ-3 scores, respectively. The positive and significant effects observed at the midline seemed to have vanished at the endline evaluation. This may suggest that any of the studied interventions did not have sustained effects on caregivers’ KAP and children’s developmental outcomes. No cost-effectiveness was therefore established at endline.

*Table 4. Annualized unit costs in US\$ at midline and endline*

	Health facility-based		Health facility plus home-based	
	Financial	Economic	Financial	Economic
	Midline			
Sampled caregiver/child dyads	27.36	47.58	50.85	88.84
Total caregiver/child dyads	4.99	8.67	10.01	17.50
	Endline			
Sampled caregiver/child dyads	81.50	190.18	130.80	321.77
Total caregiver/child dyads	6.76	15.76	11.71	28.81

## 4 DISCUSSION

From the feasibility study, the results indicated that even with the reported barriers and challenges, integrating ECD messages into the health systems is feasible with regards to its perceived performance, usefulness, uptake, and efficiency in service provision. The reported facilitators were highly suggestive of the feasibility of the intervention at the facility and community levels. Further, given the reported benefits of and satisfaction with the implementation of the intervention, there seemed to be general acceptance of the intervention by both the users and the providers. As the intervention leveraged existing health structures, the implementers felt that it could be sustained within the community. The existence of a robust community health strategy is a strong indicator of determining the success and sustainability of the intervention. On the other hand, the reported barriers in service provision such as inadequate staff, high workloads, low staff motivation and competing demands on CHVs may have negatively affected the implementation of the intervention.

When we considered change over time within study arms, all caregiver and child outcome scores among participants in the intervention arms were significantly higher at endline compared to baseline. This finding suggested that the intervention positively influenced caregiver knowledge and practices scores, as well as children ASQ scores between baseline and endline.

The quantitative results at midline demonstrated a significant impact of the intervention on caregiver practices, as well as child outcomes when children were aged between nine and ten months. Knowledge scores of caregivers in both intervention arms were not significantly different from those in the control arm. To note is that caregiver knowledge scores were close to the maximum levels at baseline and there was limited room for improvement in subsequent survey rounds.

Although the practice scores of the caregivers and the children's ASQ-3 scores in the intervention arms were significantly higher than those in the control arm, there did not seem to be an additional value of the HF+home arm over the HF only arm which could be attributed to limited fidelity of implementation. We surmise that CHVs in the HF+home arm perhaps did not provide ECD counselling during the home visits as they should have.

At the endline when the children were aged 24-27 months, the effects of the interventions on caregiver practices and children's outcomes had disappeared. These results differ from earlier studies that have shown sustained effects of an intervention delivered by primary care health workers on children's outcomes and mothers' responsive caregiving behaviors during a follow up assessment.

Some limitations to note are as follows. It is likely that caregivers in the control arm may have been exposed to similar messaging on how to improve their children's developmental outcomes, although this was not through the study intervention. Further, towards the end of 2020, nurturing care had been institutionalized within the county healthcare system and there was an intensive sensitization campaign to promote its delivery which was a possible source of contamination in the control facilities. Other issues related to possible contamination were staff transfers across the different arms. It was also clear that due to the disruptions caused by the COVID-19 pandemic and the resultant need to adhere to the restrictions to minimize transmission, the implementation of the intervention did not happen as intended in both the HF and HF+home arms.

## 5 CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusions

Our evaluation of the integration of an ECD intervention within the health system and at the community level showed that regular exposure through the health facility has short term impact on caregiver and child outcomes, but that these disappear. The findings on the endline evaluation suggested that the intervention did not have an effect after about two years of follow-up. The data on fidelity of implementation was not conclusive as it was not consistent. However, it seems that the intervention was not implemented with the intended fidelity. These results have implications on the way interventions in real-life settings should be implemented.

### 5.2 Recommendations

We make the following recommendations based on our findings:

#### 5.2.1 Recommendations for program implementation

- 1 When implementing an intervention at the health facility, it is important to take into consideration the health service providers' workload, as this may have an impact on fidelity of implementation of intervention activities;
- 2 Future implementation should consider measures to actively encourage caregivers to visit health facilities for regular growth monitoring;
- 3 There is need for good records on the fidelity of an intervention to be able to adequately establish the dose-effect relationship;
- 4 Interventions should consider integrating ECD content into the regular growth and developmental monitoring visits beyond the initial immunization visits as part of a health facility-based package of services;
- 5 Intervention components could be varied to suit the needs of different participants such as younger caregivers or those who are single. Other considerations are the need to institute male-specific intervention activities which provide clear and specific ways through which male caregivers can be involved in nurturing care.

#### 5.2.2 Recommendations for future evaluations

- 1 We suggest further research, with investigation of possible confounders (such as participants' awareness of parenting interventions, fathers' involvement, service providers' skills) to conclusively determine the effectiveness of similar interventions.
- 2 Interventions premised on improving caregivers' ECD knowledge and practices should obtain accurate information on pre-intervention levels to enable use of analytical methods which consider pre-evaluation status.
- 3 Other similar studies are required to provide conclusive findings on cost-effectiveness.



## Acknowledgements

This report provides a summary of the findings from an evaluation study that was conducted by the African Population and Health Research Center's (APHRC) Early Childhood Development (ECD) Program within the Maternal and Child Wellbeing (MCW) Unit. We are grateful to the APHRC research and field teams for their involvement during various stages of the study. We would like to thank the project staff from the implementing organization – PATH – for their considerable efforts in facilitating our understanding of the intervention's implementation. We acknowledge the technical and logistical/administrative support provided by the Ministry of Health at the national and sub-national levels. We are thankful to the members of the Strategic Advisory Team (SAT) for the technical support they have provided throughout the project period. The voluntary participation of study participants in this research was vital as they provided important information which culminated in this report. This work was supported by the ELMA Philanthropies, and PATH through a sub-grant from the Conrad N. Hilton Foundation.

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