Implementation of parenting interventions through health services in Jamaica

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Abstract

Integration of parenting programmes that promote early child development with health services has been recommended as one strategy to reduce the large numbers of children not achieving their potential in low and middle income countries. There is limited information on implementation to guide integration for delivery at scale. We conducted a cluster randomized trial of 1) a home visit and 2) a health centre based intervention, in primary health services in Kingston, Jamaica, delivered separately or combined. The two approaches to delivery had similar effects on child cognition (home visit 0.34SD; health centre 0.38). In this report, we describe the inputs required such as intervention content, staff training and supervision and resources. Intervention delivery was assessed through contacts achieved and quality documented. Views of health staff (n=29) and mothers (n=25) were obtained through qualitative interviews and analyzed using thematic content analysis. The interventions provided modeling of behaviours and activities, and interactive practice but varied in how this was conducted. Supervision was provided by the research team. Community health workers (CHWs) conducted 75% of planned home visits and 83% of mothers attended all 5 health centre sessions. CHWs were able to implement the interventions with adequate to good quality. Mothers and health staff perceived benefits for mothers' parenting practices and child development. Health staff also felt they personally benefited. Mothers who received both interventions preferred the home visit intervention and thought their child benefitted more. The main implementation challenges perceived by CHWs were engaging parents who were less interested, and conducting the intervention in addition to their existing workload. Staff workload was the main challenge reported by nurses. Sustainable implementation at scale would require investment in additional staff, particularly for programme management and supervision.

Key words: parenting, health services, implementation, child development

Introduction

Millions of children in low and middle income countries do not attain their developmental potential (Black et al, 2016) and interventions that assist parents to support children's early development are needed (Berlinski & Schady, 2015;Lake & Chan, 2015). Integration of parenting programmes with health and nutrition services has been recommended (Black & Dewey, 2014;Richter *et al*, 2016). Integrated models have included home visits (Powell *et al*, 2004), home visits combined with group sessions at health facilities (Hamadani *et al*, 2006;Yousafzai *et al*, 2014) and individual counseling or play at health clinics (Nahar *et al*, 2012;Potterton *et al*, 2010). There is therefore increasing impact evidence showing these interventions are effective but much more limited information on implementation issues (Yousafzai and Aboud, 2014). This information is needed to inform decisions around mode of delivery, training and supervision required, and the barriers and enablers to intervention implementation. Furthermore, investigating health workers' perceptions of a parenting intervention is important if we plan to integrate it with their current workload as their views are likely to affect compliance. Similarly mothers' perceptions may affect their engagement with the intervention.

Interventions need to be effective in improving development and feasible as part of an existing service and delivery at scale. A more intensive home visit intervention, delivered by community health workers (CHWs) employed in health centres, benefited child development (Powell *et al*, 2004). CHWs are para-professionals given some training to support aspects of work within the primary care system. Their role can vary from predominantly community visits to provide basic services, to support for activities in centres. Education level, training and remuneration also vary

by country (Haines *et al*, 2007). We adapted the previous home visit intervention to increase feasibility of scale up by reducing visit frequency to fortnightly and visit duration to 30 minutes. Duration of training for the CHWs, and the amount of play materials provided to families were reduced. We also developed a group intervention designed to be delivered at health centres during routine child health clinics. This approach also benefited child cognitive development (Chang *et al*, 2015). We conducted a cluster randomized trial of the two interventions in Kingston, Jamaica. Twenty health centres were randomly assigned to the health centre intervention or not and the home visit intervention or not, yielding four groups control, health centre only, home visit only and both interventions. 396 mothers-infant pairs were recruited at the six-week post-natal clinics (Walker et al, 2015). The primary impact outcome was children's development and the interventions had similar effect sizes for development, health centre compared with groups that did not receive this intervention 0.38 SD; home visit compared with groups with no home visits 0.34 SD (Walker *et al*, 2015). There was no suggestion that combining the interventions had any additional benefits. The annual cost of the interventions, including cost of health staff time for delivery, was US $100. 9 per child for the health centre intervention and US$ 245.1 per child for the home visiting intervention (Walker *et al*, 2015), with the home visit intervention requiring more of the community health workers' time for visits and travel to and from the homes.

In this paper, we report information needed for planning for implementation (Yousafzai & Aboud, 2014), including content, training and supervision of staff, and resources required. We assessed effectiveness of intervention delivery through number of expected contacts achieved and quality of the sessions. In a sub-sample of mothers and health staff we obtained information

on perceived benefits and the views of the health staff on challenges that may have affected implementation.

Methods

Sample

Information on intervention delivery (dosage, quality of sessions) was based on data available for the full sample in all intervention centres. A sub-sample of participants were selected for the qualitative interviews from the five clinics with the health centre intervention only and the five conducting both the health centre and home visit interventions. Two CHWs and 1 nurse were interviewed per clinic (1 nurse declined). Twenty-five mothers from the impact evaluation participants were interviewed, 3 per clinic for the health centre intervention and 2 per clinic for the combined intervention (fewer mothers were enrolled in centres delivering home visits). CHWs were asked to suggest mothers who had varying levels of participation.

Ethics

Ethical approval was obtained from the University of the West Indies Ethics Committee and the Advisory Panel on Ethics & Medico-Legal Affairs and the South East Regional Health Authority, Ministry of Health, Jamaica. The trial was registered with Current Controlled trials, registration number ISRCTN43108304.

Intervention design and resources

In Jamaica, government primary health centres provide free child health clinics, staffed by nurses and CHWs, for health checks and immunizations. Children attend clinics at 6 weeks, 3, 6, 9, 12 and 18 months of age. CHWs conduct growth measurements at child health clinics, have duties at other clinics within the centre and conduct community visits to follow-up with clients. CHWs

are full-time paid staff and typically have some secondary level education with a minimum of complete primary level education. Most centres in the trial had 2 nurses (median 2, inter-quartile range (IQR) 2,3) and 3 CHWs (IQR 2,3). Both interventions were delivered by CHWs and used interactive strategies with demonstration of behaviors and activities, practice by parents and encouragement and feedback, but differed in how the demonstration was provided, number of sessions, and amount of practice and feedback. The interventions are described below with further details in Table 1.

Health centre intervention

Attendance at child health clinics is high as immunizations provided are required for entry into primary school. The intervention made use of time parents spend waiting to be seen by a nurse and was delivered at the five health visits from 3-18 months. It would therefore reach most families using the primary health services, and did not require additional time at the centre by the parent.

Short films were shown of mothers doing behaviors we wished to encourage, followed by interactive discussion, demonstration and practice of activities. Nine films of approximately 3 minutes each were developed with a team experienced in health education (Development Media International, UK) and were filmed in Jamaica with five mother-child pairs. Three films were shown at each visit. A different combination of topics was shown when the children in the impact evaluation sample reached the age of the 3, 6, 9, 12 and 18 months health visits. DVDs were produced with the set of 3 topics looped to be shown three times. Films were shown in the clinic waiting area. Afterwards, the CHW led an interactive discussion of the films and demonstrated the activities. Parents were encouraged to practice the activities and to continue them at home. The CHWs also demonstrated how to make simple toys from household

materials. The intervention was provided to all parents attending the clinic. The median number of parents in the waiting areas was 37 (IQR 26,50).

At each visit, nurses gave the mothers message cards with simple language and pictures that reinforced the topics on the films. They reviewed the cards with the mothers and encouraged them to do the activities. The nurses gave parents a simple picture book when children were aged 9 and 12 months, and at age 18 months a puzzle and 4 blocks.

Home visit intervention

The home visit intervention was based on the curriculum used previously in Jamaica (Grantham-McGregor *et al*, 1991) modified to increase feasibility of scaling up. Visit frequency was reduced from weekly to twice monthly, visit duration was shortened to 30 minutes, and fewer play materials were provided. Children were visited from 6 to 18 months of age. CHWs conducted play sessions with the mother and child to encourage mother-child interaction and show mothers ways to promote development. CHWs were assigned up to 5 families, giving a maximum of 2-3 visits to be conducted weekly.

Training and supervision

Training workshops for CHWs for each intervention were conducted over three-days and included review of content and methods, small group practice and role play (Table 1). CHWs were given a manual with detailed guidelines on the intervention approach and activities. Nurses were trained in the goals and content of the interventions and were asked to ensure that the clinic sessions and home visits took place. Supervision of quality of implementation was provided by the research team.

For the health centre intervention, a supervisor visited each centre prior to beginning the set of topics for each of the 5 health visits, to review the topics and provide additional guidance in

conducting discussions and practice. Quality of sessions was observed every 6 weeks in each health centre. For home visits, quality of visits was observed monthly for each CHW and supportive feedback given on the conduct of the visit. Further details on training and supervision are given in Table 1.

Resources required to implement the interventions are summarized in Table 2. These included staff time, materials provided to clinics and families and, in the case of the health centre intervention, equipment to view the DVD. Resources for development of materials (films, manuals) are not included. The home visit intervention was modified from an existing model developed and evaluated over several years (Grantham-McGregor *et al*, 1991;Powell *et al*, 2004). The health centre intervention was newly designed, but informed by the earlier work. Development included scripting of films and film production, development of training workshops and manuals.

Measurements

Intervention implementation

Supervisors observed home visits (n = 180) and clinic sessions (n= 144) and rated the quality of the CHW's interactions with the parents using checklists. The start and end time of the home visit or discussion and demonstration session in the clinic were noted. In the health centres, four aspects of CHW-parent interaction during discussion and demonstration session were rated using a 3 point rating (hardly occurred, some of the time, most of the time). Supervisors rated whether CHWs acknowledged and repeated parents' comments, moved around the group to involve parents, and whether she praised parents for their contributions to the discussion or practice. The final rating was of parent participation in the session. For the home visits, the supervisor rated as

poor, adequate or good, the CHWs conduct of the steps to demonstrate the activities and her relationship with the mother and child. The supervisor kept records of the number of home visits conducted by each CHW and information on attendance at the clinic was obtained at the end of the intervention by parent report. Information from the observation check lists were summarized as median and IQR.

Qualitative interviews

At the end of the intervention, semi-structured interviews using an interview guide were conducted by a researcher not involved in the interventions. Aims were to identify the benefits of the program as perceived by health staff and mothers, challenges the health staff felt they faced in implementation and whether participants had a preference between the two interventions. Interviews were recorded then transcribed. CHWs and nurses were interviewed in a private area in the health centre, and mothers in their homes. Interviews with mothers lasted approximately 20 minutes, interviews with CHWs lasted between 30 minutes to 1 hour while interviews with nurses lasted between 20-30 minutes.

Analysis

All interviews were taped and transcribed and the transcriptions were checked for accuracy against the audiotape. The data were analysed using the framework approach (Ritchie & Spencer, 2002) in a five step process which involved: i) reading and rereading the transcripts, ii) identifying themes and subthemes and constructing an index of codes grouped into categories, iii) applying the codes to the individual transcripts, iv) rearranging the data in charts of each theme and/or sub-theme with entries for each respondent under each theme and v) examining the

charts to identify the key characteristics of the data. This process was conducted for each of the three categories of respondents (mother, CHW and nurse) and in a final step the three analyses were compared to look for commonalities and differences across type of respondent. The number of participants who reported each theme/sub-theme was recorded to indicate the salience of each within the data. Similar themes were evident across the respondents in the health centre only and the combined health centre and home visit group and given the similarity in the themes and the small numbers of respondents in the sample, we analysed the data from these two intervention groups together.

The initial thematic framework and index of codes was developed by HBH and she trained a research assistant to apply the codes to the transcripts and prepare the charts by theme and sub-theme. The training involved coding five transcripts from each respondent-type together, followed by coding a further three transcripts independently and comparing results. The research assistant coded the remaining transcripts and counted the number of participants who reported each theme or subtheme. Any on-going queries were discussed and resolved together. The final stage of mapping and interpretation was conducted by HBH.

Results

Implementation

Eighty-three percent of mothers in the impact evaluation sample attended all 5 intervention sessions. When mothers could not attend, children were usually brought to the clinic by their father or other relatives. A median of 18 home visits (IQR 11-24) was conducted or 75% of targeted twice-monthly visits for one year from child age 6 to 18 months. Intended visit duration was 30 minutes but actual median duration was 20 minutes.

The sum of the four ratings of Parent-CHW interaction (potential total score 4-12) had a median of 10 (IQR 9,11) indicating that the CHWs were generally able to conduct interactive sessions. The home visit supervisor rated as poor, adequate or good, the CHWs conduct of the steps to demonstrate the activities and her relationship with the mother and child. The CHWs had some difficulty encouraging the mothers to talk about the activities (12.8% poor) and did not encourage or praise the mothers sufficiently (40.4 % poor). All other aspects of the visits had combined adequate or good ratings of 90% or higher.

Qualitative interviews

The themes and sub themes from the qualitative interviews are summarized in Table 3.

Benefits to Mothers and Children

Mothers, CHWs and nurses perceived similar benefits for mothers including increased knowledge of child rearing and appropriate activities to do with young children, talking and playing more with child and showing more love (examples are given in Table 4). Some CHWs and nurses said the intervention increased mothers' motivation and a few thought it led to more father involvement (Table 3).

Mothers and CHWs felt the interventions benefited children's development and prepared them for school (Table 4). Mothers also mentioned children being exposed to new experiences while CHWs felt there were benefits to children's self-esteem.

Benefits to Health staff

The CHWs reported that participating in the interventions increased their knowledge, job satisfaction and interpersonal skills. For example:

The interaction of the mothers... Yes they take part and some of them practice because when they come back you could see the babies enjoying what they doing. And so it makes me feel like I've been doing something. (*Increased job satisfaction)*

It help me to develop, mek me open up some more cause apparently, I use to be a shy person; so now I'm not a shy person (Better interpersonal skills)

Nurses also felt the intervention helped the CHWs' professional growth, as well as increasing their own knowledge.

... I like what I see with the growth of my staff because you know just come to work every day ... you just do what you have to do but when you become integral in the growth and development of a child ... they can actually see this child improve (CHW, Professional growth)

Whenever they come at the different stages now, you're thinking okay what should they be doing, what should they be learning, what could they be learning and you are remembering the programme (Nurse, Increased knowledge)

Challenges faced implementing the interventions

The main challenges perceived by CHWs were difficulties with engaging some parents and staff workload. CHWs enjoyed conducting the intervention with the majority of mothers, however felt some were uninterested or would complain. Mothers who were sometimes not at home during the pre-arranged time for the visits was also mentioned as a challenge.

Staff workload was perceived to affect both interventions. Related to this, some CHWs said that not all the CHWs were willing to conduct the discussions for the health centre intervention and so the work generally fell on one person.

Maybe I'm not on the road working this week but I need to do visits. There are times I need to go visit and I can't because we are short-staffed (home visit challenge)

I needed the other CHWs on the program to get in the discussions; I had to be giving the talks a lot, persons just back out (health centre challenge)

Staff workload was the main concern among nurses for example one said

There are days when we really do feel overwhelmed, when the workload is heavy.

Less consistently reported problems for the health centre included crowding and problems with operating the television and DVD player. The challenges due to crowding and the overall level of noise and distractions were greater in centres that had a general waiting area with no separate area for the child health clinic.

> *If they come when we have a full clinic, sometime the ones that are supposed to be participating not getting the chance. The others, for instance, they come for family planning, they don't want to hear, they don't want to watch and it can be disruptive*

Preferences for type of intervention

Of the ten mothers from centres with the combined intervention, nine indicated that they preferred the home visits to the health centre intervention. The main reasons were that the home visit was more private, with less noise and distractions, and mothers felt their child benefited more as it was more personalized.

> *At the clinic sometimes too much noise…when you come up here, I kinda focus more on whey dem say you must do with her. Much better when dem come to my home.*
>
> *Because by coming there, they get to spend more time with the child and know more about the child.*

The mother who preferred the health centre intervention liked the videos and felt the CHW who visited her didn't spend enough time.

Six of 10 CHWs from centres providing both interventions also indicated a preference for home visits. Consistent with mothers, they said the home was less noisy, with more space and fewer distractions. They also felt mothers showed more interest and were easier to engage.

> *You spend more time with the mother and the child; a more quiet place so there is more interaction there.*
>
> *The effectiveness is getting them at home, cause you get dem on a one on one*

Three CHWs felt that both interventions were important and did not express a preference.

> *I wouldn't separate the two. One couldn't work without the other because you introduce it in the clinic and then there is the home visit to do follow-up.*

Advantages they saw of the clinic included being able to work with a group of mothers and mothers were available to participate whereas at home they were sometimes busy with household chores. Advantages of the home visits included being able to see the home environment and work with the mother one-on-one. One CHW who felt under pressure with the workload preferred the health centre intervention, because she was concerned about the time needed for home visiting.

Discussion

The results indicate that the interventions were implemented with adequate quality and were valued by staff and parents who perceived benefits for themselves and the children. The findings suggest the interventions have potential for delivery through health services. The health centre intervention provides an alternative approach to delivering a parenting program. The choice of intervention would depend on the context, for example culture, attendance rates at health centres and infrastructure.

The interventions were designed to be feasible for CHWs to integrate with their usual duties. The health centre intervention utilised time when the CHW was assigned to the child health clinic, and required no additional visits to the centre by the mother. However, the setting posed challenges with large group sizes, noise and overcrowding (Walker *et al*, 2015). In the qualitative interviews, CHWs felt lack of interest of some parents was a challenge, and that some CHWs were reluctant to lead the group sessions. Both mothers and CHWs felt that the clinic

conditions made participation more difficult than in the home environment. Strategies to reduce group size may be needed, including ensuring a separate waiting area in the centre for the child health clinic.

For the home visit intervention, the number of families assigned per health worker was limited to five. CHWs reported that it was still sometimes challenging to find time to conduct the visits and overall a median of 75% of planned visits were made. Visits were shorter than intended, however quality of the visits was adequate to good. For wider scale implementation additional staff or targeting to families most in need would be necessary. A limitation of the study is that due to resource constraints we were unable to conduct interviews with the mothers and CHWs who participated in the home visit intervention only. We made the decision to omit this group since similar interventions had been implemented previously.

The duration of training was the same for the two interventions and manuals were provided to the CHWs. Frequency of supervision was similar and included observation and supportive feedback. The reluctance of some CHWs to conduct the health centre discussions, and the difficulties observed with some aspects of the home visits related to supporting mothers, reinforce the need for continued supportive supervision for effective implementation. Strategies for sustainable supervision are a critical issue for scale up of ECD parenting programmes (Yousafzai & Aboud, 2014).

Despite the difference in number of contacts, and individual versus group delivery, the interventions had comparable benefits for child cognitive development. The use of films in the health centre intervention to demonstrate behaviours, followed by practice may have allowed the mothers to master the skills sufficiently to replicate them at home. Reinforcement by the nurses

may also have helped mothers to see the behaviours introduced as important. It may be possible to increase the benefits by including sessions at antenatal clinics and the first postnatal clinic at 6 weeks. Additional sessions beyond 18 months may be more difficult as routine clinic visits are infrequent after this age.

Benefits from the home visit model are well established and replicated in other countries (Grantham-McGregor & Smith, 2016). The adaptations we made to facilitate scale up included reduction in visit frequency, shorter visit duration and fewer play materials compared with earlier evaluations. This modified approach yielded smaller and less comprehensive benefits than the original model (Grantham-McGregor *et al*, 1991;Powell *et al*, 2004). The findings suggest that some areas of the training need strengthening. Visit duration was shorter than intended so the importance of taking time to engage with the mother and child and allow time for practice of activities may need more emphasis. Additional time on building relationships with the families may also be helpful to reinforce the CHWs understanding of a family's circumstances and why they may not always be available for planned visits

CHWs had poor ratings for 2 aspects of the visit related to interaction with the mothers suggesting that more time is needed to practice listening to, and interacting with the mother across varying activities throughout the training and in encouraging and praising the mother. These results are in line with a recent study of seven programs in Latin America and the Caribbean showing that only a third of observed visitors provided positive reinforcement (praise) to the caregivers and visitors had difficulty encouraging mothers to talk about activities in (Leer *et al*, 2016) . The duration of training was only 3 days compared with 10 to 30 days in earlier trials. This may have been insufficient for this type of intervention which included more activities with more detailed interaction than the health centre model.

These findings also reinforce the need for supportive supervision and for adequate training of supervisors so that they provide modeling and feedback when activities may be done too quickly or not enough time is spent interacting with the mother and providing encouragement and praise.

The qualitative results indicated that the mothers valued the interventions and saw benefits for themselves and their children. It is possible that despite asking health staff to suggest both parents who had participated well and those who had not, that health staff nominated mainly those who had participated well. This may tend to increase the number of mothers reporting benefits. The health staff perceived similar benefits for mothers and children, and benefits for themselves such as increased knowledge, job satisfaction and personal growth. The perceived value to health staff is a positive finding for potential sustainability with appropriate support and supervision.

The interventions ended at age 18 months and leave a gap in support at a critical period for children's development until they are able to enter preschool. It is uncertain whether the benefits seen will be sustainable and continuation of the home visit intervention, possibly targeted to high risk families, may be necessary.

Nurses and CHWs expressed concerns about staff workload. The interventions were implemented with existing health staff. Thus staff workload likely affected delivery, particularly home visits where lack of staff may have prevented the CHWs from conducting visits. Part of the rationale for integrating early childhood development (ECD) and health services is the advantage of shared delivery. However, additional resources and staff are likely to be necessary to expand services. In the Jamaican health service, CHWs are full-time paid staff. Challenges with staff workload and ability to add duties may be greater where delivery agents are less

formally part of the health service or volunteers, with competing responsibilities. No monetary incentives were given to the CHWs and the only additional payment was compensation for travelling expenses for home visits. Lack of incentives may be a greater issue where staff are volunteers or only receive an honorarium.

The nurses' workload is likely to limit their ability to fully supervise ECD programmes. Sustainability will require staff to manage the programme and to provide supervision (monitoring and support). Calculation of intervention costs included supervision but not management (Walker et al, 2015), benefit: cost ratios were high so additional costs should not endanger the cost-effectiveness of the intervention.

Mothers who participated in both interventions, preferred the home visit to the health centre intervention as they liked the privacy and thought their children benefited more. These preferences may be influenced by culture and by the characteristics of the group session which was part of routine clinics with large group sizes and limited opportunity for interaction among mothers. Centre/group based interventions may be more attractive for mothers where they also provide social interaction and support (Singla & Kumbakumba, 2015).

CHWs also tended to prefer the home visit interventions although some did not indicate a preference. Interactive group sessions are challenging to lead, particularly where conditions are difficult as in noisy, crowded health clinics, and this needs to be considered when choosing between a group model and individual interactions in the home. In a NGO implemented group parenting intervention, delivery agents also perceived managing large groups to be a challenge (Singla & Kumbakumba, 2015).

In conclusion, the interventions have potential for integration with health services, however, staff workload and the need for supportive supervision will need to be addressed. While integration with health services offers logistical benefits, effective ECD programmes will require sustainable investment in additional staff, particularly for supervision, and for materials. The primary health services in Jamaica and similar middle income countries are comparatively robust. In developing integrated programmes consideration is also needed of the capacity of services and infrastructure needed to enable effective implementation.

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Table 1. Content, delivery, training and supervision of home visit and health centre interventions

	Home visits	**Health centre groups**
Delivery	CHW from health centre conducted play session with mother and child to show mother ways to promote her child's development.	Showing of films depicting mothers doing behaviors to promote child development, interactive discussion, demonstration and practice of activities in waiting area.
Contacts	Target, fortnightly from age 6-18 months. Median visits conducted 18 (IQR 11-24) or 75% of target.	At 5 routine immunization visits to health centre (3,6,9, 12 and 18 months).
Content	The visits followed a structured curriculum including concepts such as place, shape and size, and language activities that encouraged mothers to chat with their children and to label objects and actions The CHWs demonstrated new play and language activities and supported the mother as she practiced them with her child. Mothers were encouraged to continue play activities between the visits and to integrate them in their daily routines.	9 short films with the topics: Love, Comforting baby, Talking to babies and children, Praise, Using bath time to play and learn, Looking at books, Simple toys mothers can make, Drawing and games, and Puzzles. 3 topics covered at each health visit. After showing the films CHWs led discussion of topics, demonstrated activities shown (e.g. playing peek-a-boo, looking at a book) and encouraged the mothers to practice the activity at the clinic and continue activities at home. Message cards were given out by nurses.
Duration of sessions	Planned visit length 30 minutes. Actual median duration of visits (from visits observed by supervisor) 20 minutes (IQR 16-22).	Films approximately 20 minutes, group session median 16 minutes (IQR 14-20 min).
Training	3 day workshop for CHWs with demonstration of toys, activities and conduct of visits followed by small group practice and role plays. Emphasis was placed on the approach to the visit including relationship with mother and praise for mother and child. CHWs were given a manual with overview of program objectives and content, guidelines to conducting visits and the content to be covered in each of the visits (toys, messages, activities). One day workshop for nurses to review program goals and content and nurse's role in monitoring that visits were done.	CHWs workshop over 3 days covering review of films, training with role plays on how to conduct interactive discussion of the messages/activities on the films, and on demonstrating activities. CHWs were given a manual with overview of program objectives and content, guidelines to engaging with mothers in the discussion and demonstration sessions, and the content for each of the sessions, with suggested dialogue and details of each activity. Nurses workshop on 2 days for orientation to program and CHW role, review of films, and materials, nurse's role and review of message cards.
Supervision	A supervisor accompanied the CHWs on visits to monitor quality and provide feedback (1 visit/CHW/month) The supervisor also met with the CHWs at the health centres once per month to review visits and record books.	Supervisor reviewed topics prior to delivery of each new set of topics and provided guidance in running the interactive discussion, demonstration and practice. Quality of implementation was monitored approximately once every 6 weeks.

Table 2. Intervention resources and personnel time

	Home visits	**Health centre**
Materials supplied to clinic/clinic staff	Manuals for CHWs, record books, bags to carry materials for visits.	TV, DVD players and installation costs (e.g. grills, electrical work) DVDs. Manuals for CHWs and nurse. Home-made demonstration toys and materials to make toys, container for toys.
Clinic staff time	CHW 1.5 hours per visit, including travel time. 15 hours per month to visit 5 children. Nurse 30 minutes/month to monitor that CHW's made visits.	CHW 30 minutes for preparation and conduct of discussion session at child health clinic. Total 2 hours month. Nurse 2 minutes/mother-child pair, to review message card, encourage mother to do activities. Total time variable depending on number of children attending centre.
Play materials provided to families	6 Picture books, 2 puzzles. Toys made from empty containers, soft toys (a ball and doll) crayons, and wooden blocks. Toys left in homes and exchanged at next visit	2 Picture Books, crayon, 3 piece puzzle, 4 wooden blocks, 6 message cards, given to each family
Training resources	3 day workshop for CHWs and 1 day workshop for nurses, requiring trainer time and costs for venue and refreshments	3 day workshop for CHWs and 2 day workshop for nurses, requiring trainer time and costs for venue and refreshments
Supervisor time	Supervisor to monitor visit quality and provide feedback (1 visit/CHW/month) and meet with CHWs at the health centres once per month to review visits and record books	Supervisor to provide guidance in running the discussion and practice and monitor quality of implementation once every 6 weeks

Table 3. Themes and sub-themes from qualitative interviews (values in parentheses are numbers reporting)

Mothers n=25*	CHWs n=20*	Nurses n=9*
Benefits to mothers • Increased knowledge (20) • Show more love (9) • Play more with baby (7) • Increased patience (6) • Talk more to baby (5) • Help bond with baby (3) • Not helpful (1) Benefits to child • Child is smarter (12) • Child exposed to new experiences (6) • Child will be ready for school (5) • Child talks more (5) • Child plays alone more (1) Preference for home visit or clinic intervention (total n=10) • Prefer home visit (9) • Prefer health centre (1)	Benefits to mothers • Increased knowledge (18) • Show more love (14) • Talk more with baby (8) • Increased motivation (7) • Spend more time with baby (7) • Play more with baby (7) • Praise baby more (4) • Increased father involvement (3) • Helps bond with baby (3) • Less stress (1) Benefits to child • Increased self-esteem (4) • Get ready for school (4) • Child talks more (3) • Child is smarter (1) Benefits to CHA • Increased job satisfaction (16) • Better interpersonal skills (13) • Increased knowledge (12) Challenges • Mothers' attitude or behaviour (15) • Staff workload (6) • Setting (4) • Equipment (3) • Father attitude (1) • Transportation (1) Preference for home visit or clinic intervention (total n=10) • Prefer home visit (6) • Prefer health centre (1) • No preference (3)	Benefits to mothers • Increased knowledge (7) • Show more love/ Bond with baby (5) • Increased talk with baby (2) • Spend more time with baby (2) • Involve fathers (1) • Motivate mothers (1) • More play (1) Benefits to CHAs • Professional growth (3) Benefits to nurses • Increased knowledge (3) • Increased job satisfaction (3) • Interpersonal skills (1) Challenges • Staff workload (5) • Equipment (2) • Mothers' attitude (2) • None (4)

*Mothers 15 from the clinic only intervention and 10 from the combined intervention;
*CHWs 10 from clinic only and 10 from combined intervention;
*Nurses 5 from clinic only and 4 from combined intervention.

Table 4. Examples of perceived benefits of the intervention for mothers and children

Theme	Quotations
Benefits to mothers	Mothers: "I didn't know at that age you could show her a puzzle and she would get it. I wasn't thinking of giving baby a puzzle" (increased knowledge) "Yeah, cause when I have him I thought this is just a baby – you put pampers on him, make sure that he eats and that's it. It just never occur to me that you must play with him." (Increased knowledge) "If she's crying, I don't feel that I'm spoiling her, I just take her up and hush her and love her" (showing love) "I didn't use to play with her before. I would just give her the toys and she would sit down and play with them. Since the programme I'll sit with her, sing with her and play with her" (Increased play with child) For example, I take him for a walk and show him different, different things and talk about them." (Increased talk) CHWs: Because some of them don't talk to their child. When the programme just started and you asked them to talk to their babies it was a hard task for them but introducing it every day to them, you see them start." (Talk more with baby) "Like sometimes you will sit and you watch them and see how they love up the baby, kiss them, play with them and so" (Show more love) "Some of them didn't know what to do, especially some of the younger ones so when we come out and show the videos and demonstrate, they demonstrate back to us and they learn" (Increased knowledge) "Some of them don't spend no time with their babies and like how this programme come in now, they find time for the babies (Spend more time with baby) Nurses: "They saw they had a role not only to feed, to keep clean and other things, so the mental ability of the child, they saw what they had to do" (Increased knowledge) "The mothers' attitude towards the children, most of them, you know changed. Some of them used to rough them and shout at them but they have learnt to take care of them and how to love them" (Show more love) I would notice that the mother keeps talking to the baby and they want nurse to know that baby knows this and baby knows that so they say 'show nurse your nose' or 'show nurse your eyes'. It's really good to see them doing that. (Increased talk with baby)
Benefits to children	Mothers: "When they go to school now, they know these things already, so she will move faster" (Child will be ready for school) "With her skills, I think she is a bit advanced for her age. So I think it helped her in that way. Let her be more advanced" (Child is smarter) "It helps fill out his vocabulary" (Child talks more) "It show her different things and everyday she does something new and learns something new" (Child exposed to new experiences) CHWs: They clap themselves and praise themselves that would build their self-esteem" (Increased self-esteem) "When they reach school age they are far advanced than those in the classroom already – you know – they know the book, the puzzle whatever" (Child will be ready for school) "You have some children, they talking now. Because the parents talk to them, some of them talk" (Child talks more)