KENYA - Exploring the use of mobile phone technology for optimizing, tracking and responding to children's developmental progress in Korogocho, Nairobi, Kenya, Saving Brains

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Overview

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Overview

ABSTRACT
Background:

The massive use of technology can be leveraged to facilitate access to growth and development programs for children with access constraints. Existing programs supporting children's growth and development especially for children younger than three years are inadequate and not accessible to most families. In most cases, primary caregivers are unable to identify delayed milestones in their children's growth and development due to inadequate information on how to assess the key developmental milestones, and they often report the cases when they have become very severe. To promote early identification of possible developmental delays, the African Population and Health Research Center (APHRC) together with Val Partners developed, implemented and evaluated the use of mobile phone technology to help young mothers track their children's development.

Objective:

The objective of the study was to develop and test the feasibility of using mobile phone technology for optimizing, tracking, and responding to children's developmental progress.

Study design:

The study employed a quasi-experimental design and used a mixed-methods approach combining quantitative and qualitative methodologies. It was a two-arm study, where the first arm was trained on the use of a mobile phone application to assess their children's growth and development, while the second group received the standard of care provided by community health volunteers (CHVs). A total of 220 mothers/primary caregivers-child dyads were recruited into this study. The causal effect of the intervention was estmated using mixed linear models and the Difference-in-Differences estimator.

Study duration: 24 months

Budget: CAD 250,000

UNITS OF ANALYSIS
The survey covered sample of young mothers (including adolescents) of children under the age of three years

Scope

NOTES
Questionnaires were used to establish the use of the mobile application. Data was collected through interviews woth both mothers and fathers about their experiences with the mobile phone technology, and with caregiving.

CAREGIVING KNOWLEDGE, ATTITUDES AND PRACTICES (KAP): Was measured using a set of questions that coverd topics such as appropriate care, feeding practices, play and communication activities and learning activities likely to promote holistic development in children. Caregiving knowlege was assessed through maternal report of the different aspects of the child development. Ten questions on caregiver Early Childhood Development (ECD) knowledge was scored on a Likert scale ranging from '1' = agree completely to '4' = disagree completely

Caregiving practices was assessed by maternal self report of their responsiveness and the opportunities for afe-appropriate play and learning available to the child at home. The mother/caregiver was also asked about their involvement with the child, acceptance and provision of learning materials. One question from the child development module of the UNICEF Multiple Indicator Cluster Survey (MICS) was used to assess caregiving practices. Each activity was scored separately and a point was given for every positive response. A summated score was derived from adding up all the scores obtained. Higher scores denoted better caregiver KAP. Follow up questions per practice to validate self reports from the mothers/caregivers were asked.

Additional information such as the child's date of birth and the birth weight was obtained from the MoH Mother-Child Booklet and other health records during the initial data collection period. Where these documents were not available, the research team relied on maternal recall. Trained data collectors collected length, weight and head circumference data according to the standard protocol. Weight was measured to the nearest 0.1 kg (20). Mothers were interviewed at their hoseholds to obtain information on sociodemographic characteristics such as maternal age, eduaction and occupation, crowding (Person per room) and household possessions at recruitment. All assessements with children and interviews with mother/caregivers was conducted in the language with which the participants were most comfortable with, that is Kiswahili or English.

MENTAL HEALTH AND STRESS LEVEL: Data on caregivers' well being (mental health and stress levels) was obtained by conducting interviews with primary caregivers to establish the frequency of the use of health services. Parenting Stress Index which determines overall levels of primary caregiving stress was also administered. The tool has items rated from '1' (strongly disagree) to '5' (strongly agree) assessing stress related to parental distress and is concerned with primary caregiver perceptions of self esteem, sense of competence and role restrictions.

PROTOCOL FOR CHILD MONITORING - INFANT-TODDLER VERSION (PCM-IT): Trained field workers administered the PCM-IT to assess children's developmental outcomes. The items on the PCM-IT are derived from tools that include the Kilifi Developmental Inventory (KDI), the Developmental Milestones Checklist (DMC) and the Profile for Socioemotional Development (PSED). Information on children's functioning was obtained through a combination of caregiver self-reported questions and direct observations, similarly to the procedures used in a study conducted in Kilifi, Kenya (19). These tools have been validated among young children living in rural communities and these earlier studies have reported community acceptability.

The PCM-IT consists of measures of psychomotor skills, early cognition, functional language and socio-emotional development, and taps into five developmental domains: psychomotor skills (gross and fine motor), cognitive, language, self-help/adaptive behavior and social and emotional regulation. The psychomotor assessment combines both parental report and direct observation of the child's performance in the assessment of two main domains, locomotor development and fine motor skills. The PCM-IT items are scored '0' if the child is unable to carry out action/activity, '1' if a child able to complete action/activity momentarily or with much support/effort, '2' if the child is beginning to carry out the action/activity, with limitations to control or strength or regularity and '3' 'if able to carry out specific action/activity with little effort or force. The responses to each of the questions/items in each domain will be summed to provide a score for each area. Higher scores indicate outcomes that are more positive for children.

All the assessments of children's performance were completed individually on a one-to-one basis in a private place away from distractions but within the sight of other children to reduce anxiety. Data was collected at the participants' homes during the implementation period. These assessments took approximately one hour. On the language measure, the parent was presented with a number of words on a checklist and asked which of the words the child is able to understand and to say. Children's social-emotional behavior was assessed through an interview with the parent/home caregiver. The interview asked about the child's behavior on a number of aspects including eating, sleeping, and independent activities and playing with others. A language adaptation protocol was followed to ensure that the conceptual integrity of the original items is retained in the translation. Child developmental outcomes were assessed at two time points - at the baseline before the intervention begins, and at endline after the intervention period has ended.

AGES AND STAGES QUESTIONNAIRE - THIRD EDITION (ASQ-3) (20) was administered to establish children's 'developmental' age before the start of the intervention. This information enabled us to determine the level at which the messages which were sent to the mothers/caregivers began, as the messages on the mobile phone app were crafted according to the age of the child. For instance, with regards to motor development, if the child is able to 'sit on his/her own,' the messages that was sent to the mother/caregiver at the first contact were those where the mother was encouraged to stimulate the development of the next milestone, that is, crawling. The ASQ-3 was used to measure children's developmental outcomes in

terms of their gross and fine motor skills, language, socio-emotional and physical development through a combination of primary caregiver self-reported questions and direct observations(21). The ASQ-3 is a globally used parent/primary caregiver-reported, easy-to-use, reliable, and validated screening instrument to identify potential developmental delays among children aged between 2 and 60 months. Apart from self-reports, primary caregivers were requested to try each activity with their child to facilitate accurate item assessment. Items were scored 'yes' (= 10 points) if the child was able to perform the activity, 'sometimes' (= 5 points) if the child tried and fails but the primary caregiver reported that the child could perform the activity sometimes, and 'no' (= 0 points) if the child was unable to perform the item. The responses to each of the six questions in each domain were summed to provide a score for each area. Scores for each domain fell between 0 and 60. Higher scores indicated more positive outcomes for children.

Coverage

GEOGRAPHIC COVERAGE

The survey covered sampled young children between 6 to 24 months and their caregivers from urban settlements in Korogocho, Nairobi, Kenya

UNIVERSE

The survey covered sample of young mothers (including adolescents) of children under the age of three years

Producers and Sponsors

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OTHER PRODUCER(S)

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Margaret Nampijja	African Population and Health Research Centre	Overseeing the implementation of research activities
Kenneth Odhiambo Okelo	African Population and Health Research Centre	Lead research officer in charge of the day to day operation of the study
Silas Onyango	African Population and Health Research Centre	Assist in coordination of the project activities
Milka Njeri	African Population and Health Research Centre	Assist in coordination of the project activities
Abhishek Khamrai	Val Partners Limited	Provision of technical support in designing the mobile technology application
Dominic Muindi	Val Partners Limited	Provision of technical support in designing the mobile technology application
Brian Odhiambo	African Population and Health Research Centre	Data Documentation Specialist
Bonface Ingumba	African Population and Health Research Centre	Data Governance Expert

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Sampling

Sampling Procedure

The project targeted young mothers (including adolescents) of children under the age of three years and living in informal settlement areas in Nairobi. Community Health Volunteers (CHVs) living within the community were identified and reccruited to assist the study team to recruit mothers/caregivers who are eligible for inclusion. Effort was made to ensure equal representation of genders in the intervention as both fathers and mothers were included during communications and activities related to the project.

Deviations from Sample Design

N/A

Response Rate

The response rate was 115.45 percent because the original sample size was 220 in total but the baseline round had 254 participants recruited and interviewed

Weighting

The sample size was calculated using G* Power program (18) where the program was set to a two-sided t-test involving the difference between the independent means (18). Using a piori power analysis, we input the values of 0.05 and 0.84 for significance levels and power, repectively. Additionally, equal sample groups were assumed meaning the allocation ration of N1 (Intervention group) to N(Control group) is 1. The calculation produced a sample size of 110 for each group, which allowed for 10% attrition rate gave a result of 110. It was therefore hypothesised that with 100 caregiver-infant dyads in the intervention group and 100 in the control group, the sample size achieves 80% power to detect a difference among two groups, with an effect size of 0.4 at the 5% significance level (two-tailed test). A sample comprising a total of 220 households (caregiver-child dyads) were therefore recruited.

Questionnaires

Overview

Two Questionnaires were used during the study
The first one was (1) PARENTAL ASSESSEMENT QUESTIONNAIRE which constituted 4 themes including: Knowledge, Attitudes and Perceptions (KAP) questions, Ages and stages questions (ASQ-3), Parental report questions and stress-efficacy questions.
The second questionnaire (2) CHILD ASSESSMENT QUESTIONNAIRE

Data Collection

Data Collection Dates

Start	End	Cycle
2019-04-17	2019-05-16	N/A

Data Collection Mode

Face-to-face [f2f]

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Supervision

Data collection was supervised by carefully trained team leaders and the research team. During fieldwork, data quality was enhanced by APHRC team leads through regular spot checks and sit-ins to approximately 5-10% of each field worker's daily work to verify authenyicity of the data collected. The field supervisor certified the quality of the data through editing of the data before they were transfered to the database.

Data Processing

Data Editing

Data collection was done electronically using tablets/phones, with spot checks for quality control. Once all the data collection were completed, all the inconsistencies were resolved prior to data analysis. An automated routine to check on the data completeness, correctness and consistency was also run on 100% of the collected data.

Other Processing

Differences in caregiver KAP and wellbeing at baseline and end-line for the intervention and control groups were determined by summing the scores on the items and running a t-test for comparison.

For child developmental outcomes, raw scores were constructed by adding all the items passed for each domain on the PCM-IT. Composite scores were computed by summing the scores across all the domains. As we expected scores on each test to increase with age, the scores were standardized for age to allow for direct comparisons across tests. After the data were cleaned, quantitative data analysis was performed using Stata. A first set of analyses consisted of descriptive statistics. This will allowed us to detect similarities and/or differences between subjects' characteristics across the different groups. We compared some baseline measurements between the control group and intervention group using the t-test adjusted for continuous variables, and cluster-adjusted chi-square for binary variables. The second set of analysis consisted of assessing the causal effect of the ECD intervention in Korogocho via the DID estimator, and mixed linear model. Individual items on the PCM-IT were reviewed for missing data, as well as for floor and ceiling effects. In the case where more than 10% of the responses on the items were missing, the data was excluded from further analysis. The time taken to complete the assessment was calculated. We also calculated the totals by summing the scores of the items included in the tool to establish children's performance levels at baseline and at end-line. This enabled us to identify child development domains that have acceptable variability.

Data Appraisal

Estimates of Sampling Error

The calculation produced a sample size of 100 for each group, which allowed for a 10% attrition rate gaving a result of 110. We therefore hypothesized that with 100 caregiver-infant dyads in the intervention group and 100 in the control group, the sample size achieved 80% power to detect a difference among the two groups, with an effect size of 0.4, at the 5% significance level (two-tailed test). A sample comprising a total of 220 households (caregiver-child dyads) were therefore recruited.

Documentation

Questionnaires

saving_brains_main_parental_assessment_baseline - english.pdf

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