

Day-care for healthy child development and wider social and economic gain in urban areas in low- and middle income countries

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Day-care for healthy child development and wider social and economic gain in urban areas in low- and middle income countries

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Editorial: Day-care for healthy child development and wider social and economic gain in urban areas in low- and middle income countries

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Editorial on the Research Topic

Day-care for healthy child development and wider social and economic gain in urban areas in low- and middle income countries

Background

Rapid urbanization and socio-economic change in low- and middle-income countries (LMICs) has triggered a childcare crisis (1). As families move to the city, they leave behind traditional support networks; parents, particularly mothers, are working long hours outside the home often in informal and unstable jobs. In response to the increasing demand, informal private day cares have sprung up. Governments' responses to the pressure have been varied, and due to the intersectoral nature of early childhood development (ECD), the care for young children has often fallen between ministries (1, 2). These factors have left children from low-income families with substandard childcare (3) and at high risk of poor health and development.

This Research Topic brings the global challenge of the childcare vacuum to the attention of academics and policy makers from multiple disciplines. Despite the growing need across low and middle income countries (LMICs) to better understand childcare within low-income families, urban settings, and other complex environments, and which responses are most appropriate, the evidence base is limited (4). Systematic reviews repeatedly find limited studies of effective center-based childcare interventions to improve ECD and health in LMICs (5–7). Evidence from both high income countries (HICs) (8) and LMICs (9) indicates that cheap, but poor quality center-based child-care may worsen ECD outcomes. Cognizant of the trans-disciplinary approach to this global challenge, the special issue brings together a range of papers to explore the different dimensions of center-based childcare including the demand, policy implications, and childcare models that can

feasibly, sustainably and effectively be delivered in low-income and complex urban-poor neighborhoods in the global south.

Global evidence highlights the need for a multifaceted approach to day-care centers addressing hygiene, nutrition, safety and nurturing responsive, emotionally supportive and developmentally enriching relationship between the child and caregiver (10) and this has formed the basis of the WHO's Nurturing Care Framework (NCF) (11). The NCF is a broad framework for supporting the development of children aged 0–3 years, which recommends that environments where children live should be healthy, safe, hygienic, and provide nutritious food and responsive nurturing care. None of the components are sufficient on their own, and instead, work together synergistically to promote healthy childhood development. The period below 3 years is critical for a child's development since adverse exposures during this period can have lasting implications for their development and future success as adults (12). Key themes are highlighted in this editorial, and discussed in detail in the individual publications.

Nutrition

Despite the sustainable development goals (SDGs) targets, WHO's nurturing care guidelines, and government efforts in ensuring optimum nutrition and growth for all young children, worldwide there is still a high burden of malnutrition, with an estimated 45.4 million children under age 5 wasted and 149.2 million stunted (13). Several factors, including poor caregiver knowledge and practices of infant and child feeding, explain the persistently high rate of malnutrition especially in low income settings (14, 15). Amoah et al.'s paper published in this Research Topic examines minimum dietary requirements as a driver of malnutrition among children in an urban-poor setting in Ghana. The research revealed a significant gap in dietary diversity, with less than half of the children below 2 years meeting minimum dietary diversity (MDD) requirements, and poor caregiver knowledge and practices of infant and young child feeding identified as key contributors to poor MDD. Similar nutrition gaps were found in informal day-care centers in Nairobi (Nampijja, Langat, Oloo, Okelo et al.). Clearly, interventions including educating caregivers on infant and young child feeding are needed to ensure optimum nutrition for all children.

Safety and responsive care

Young children living in extreme levels of poverty found in informal settlements, as well as in institutionalized care are prone to receiving inadequate care and nurturing across the NCF domains. As revealed by Onayemi and Hapunda's study which is one of the few conducted in orphanages in Nigeria. Multiple individual, institutional and policy level challenges constrain provision of quality childcare in these homes. These include weak bonding between carers and the children, stigma and un-responsive caregiver attitudes. Building the evidence base to understand how care in these settings can be improved to counter the negative impacts on the socioemotional wellbeing of children is needed. The paper highlights how the lack of funds including from

governments, and poor implementation of policies undermines the ability to meet the health, nutrition and development needs of the children threatening their safety and wellbeing. In Kenya, safe and responsive care issues were reported in "baby cares" in an informal settlement, and lack of resources, knowledge and skills among care providers as well as inadequate communication between parents and caregivers were major barriers to quality childcare provision (Jegathesan et al.). Cost-effective and sustainable policy and programming interventions are critical for raising the standards of childcare services in these environments for holistic child growth and development.

WASH

Poor water, sanitation and hygiene (WASH) services in childcare centers in low income settings put children at high risk for diarrhea and other diseases (5). Poor infrastructure and limited government resources underlie poor WASH services in these communities, yet formal social accountability mechanisms to seek improvement from local government, public or private providers have often not been successful. Chumo et al.'s paper presents a novel approach to improving hygiene and sanitation within resource constrained environments. The study demonstrates that an informal social accountability process codesigned with the community and focusing on defining the issues, identifying actions, sharing information, learning and adaptation has the potential to increase the capability of even poorly resourced childcare centers to better meet sanitation and hygiene needs in childcare centers. While this does not absolve formal providers and local governments of their responsibility to provide equitable WASH service delivery, it is clear that programs are more appropriate and sustainable when communities are fully engaged in co-creation of solutions to problems that affect them.

Policy

Given the diverse challenges that affect childcare, it is useful to understand the policy landscape across the domains of the NCF. A comprehensive review of ECD policies and plans in Kenya conducted by Abboah-Offei et al. highlights key limitations including in responsive care, early learning, safety and security, and the role of fathers role in childcare. Owino and Yigezu explore fathers' involvement in childcare in urban informal settlements and those attached to commercial farms in Kenya and Ethiopia. While there are interesting differences between the two countries, the overarching similarity is that fathers still play a predominantly financial role in the care of their children. The other elements of the NCF are mainly delivered by mothers and other female caregivers. Interestingly, in both countries, use of childcare centers was relatively low, but other forms of paid childcare including use of housemaids occurred. In a few cases, children were left under the care of older siblings or neighbors, most likely because of the inability to afford paid childcare. Governments should invest in childcare services to enable low income families to access quality affordable childcare for their children. Owino and Yigezu's paper highlights the diminishing traditional family support

structures, rapidly evolving gendered work patterns, and the resulting shifts in caring roles, as an important focus for research and policy consideration.

Interventions

Interventions that respond to one or more issues raised above are needed to optimize care for young children in the urban poor communities. Three papers from one study done in Kenya (16) highlight that interventions should be designed to fit a given context, to address the existing knowledge gaps, and maximize stakeholder engagement in their conceptualization and implementation. Initiatives that leverage local (government) structures for integration, sustainability and scaling are more likely to be successful as presented in the three publications. First, a survey of childcare centers examined the quality and key drivers of quality in childcare centers in the Nairobi slums, with poor caregiver knowledge and practices being the major barrier (Nampijja, Langat, Oloo, Okelo et al.). The second paper describes a successful codesign process with center owners, NGOs, and lay community members to develop a community of practice approach to improving day-care center provider skills and practice (17). In the third paper, with implementation led by government-supported community health volunteers (CHVs) and supervised by community health assistants (CHAs), with training from an NGO with expertise in childcare (Kidogo), the intervention was found to be feasible and showed potential to improve the knowledge and practices of the center providers (Nampijja, Langat, Oloo, Amboka et al.). Hence initiatives that promote joint stakeholder participation and ownership, and which are embedded in government structures but also align with policies have a high chance of thriving. Government's role in providing guidance and support, policy framework and supervision through community health and ECD teams is important for projects and sustainability beyond the project life. We now also need more studies which track changes in developmental outcomes in relation to the improvement in the different spheres of day-care.

Conclusion

Overall, the issues and opportunities in childcare spotlighted in this Research Topic span the entire NCF, at both policy and practice levels. Governments' support and coordination with other actors is paramount. Children living in socioeconomic disadvantage deserve special priority given their unique vulnerabilities. In the context of

limited resources, low cost co-created and integrated approaches are key for sustainability. A good understanding of the specific barriers in complex low-income urban neighborhoods, and impact of specific solutions is vital for informing future investment in childcare. Lastly, facilitated shared learnings within and between countries are crucial for promoting best practices in a wider positive community of practice (18).

Author contributions

MN: Conceptualization, Writing—original draft, Writing—review & editing. PK-W: Writing—review & editing. RH: Writing—review & editing. PG: Writing—review & editing. HE: Conceptualization, Writing—original draft, Writing—review & editing.

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Improving early childhood development in the context of the nurturing care framework in Kenya: A policy review and qualitative exploration of emerging issues with policy makers

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Introduction: The Nurturing Care Framework (NCF) describes “nurturing care” as the ability of nations and communities to support caregivers and provide an environment that ensures children’s good health and nutrition, protects them from threats, and provides opportunities for early learning through responsive and emotionally supportive interaction. We assessed the extent to which Kenyan government policies address the components of the NCF and explored policy/decision makers’ views on policy gaps and emerging issues.

Methods: A search strategy was formulated to identify policy documents focusing on early childhood development (ECD), health and nutrition, responsive caregiving, opportunities for early learning and security and safety, which are key components of the NCF. We limited the search to policy documents published since 2010 when the Kenya constitution was promulgated and ECD functions devolved to county governments. Policy/decision-maker interviews were also conducted to clarify emerging gaps from policy data. Data was extracted, coded and analyzed based on the components of the NCF. Framework analysis was used for interview data with NCF being the main framework of analysis. The Jaccard’s similarity coefficient was used to assess similarities between the themes being compared to further understand the challenges, successes and future plans of policy and implementation under each of the NCF domains.

Results: 127 policy documents were retrieved from government e-repository and county websites. Of these, $n = 91$ were assessed against the inclusion criteria, and $n = 66$ were included in final analysis. The 66 documents included 47 County Integrated Development Plans (CIDPs) and 19 national policy documents. Twenty policy/decision-maker interviews were conducted. Analysis of both policy and interview data reveal that, while areas of health and nutrition have been considered in policies and county level plans (coefficients >0.5), the domains of early learning, responsive caregiving and safety and security face significant policy and implementation gaps (coefficients ≤ 0.5), particularly for the 0–3 year age group. Inconsistencies were noted between county level implementation plans and national policies in areas such as support for children with disabilities and allocation of budget to early learning and nutrition domains.

Conclusion: Findings indicate a strong focus on nutrition and health with limited coverage of responsive caregiving and opportunities for early learning domains. Therefore, if nurturing care goals are to be achieved in Kenya, policies are needed to support current gaps identified with urgent need for policies of minimum standards that provide support for improvements across all Nurturing Care Framework domains.

KEYWORDS

early childhood development, nurturing care framework, nurturing care, children under five, policy, Kenya

Introduction

More than 250 million children (43%) younger than 5 years in low- and middle-income countries (LMICs) do not reach their developmental potential due to adversities in the early years including poverty, undernutrition and a lack of nurturing care and stimulation (1–3). The Lancet Early Childhood Development (ECD) Series defines “nurturing care” as a central organizing principle for policy and practice devoted to addressing the core problem that the children in LMICs are at risk of (4). The Nurturing Care Framework (NCF) describes “nurturing care” as the ability of nations and communities to support caregivers and provide an environment that ensures children’s good health and nutrition, protects them from threats, and gives them opportunities for early learning through responsive and emotionally supportive interaction, see Table 1 (1).

The NCF aims to inspire multiple sectors including health, nutrition, education, labor, finance, water and sanitation, and social and child protection to work together in new ways to address the needs of the youngest children (1). It articulates the importance of responsive caregiving and early learning as integral components of good quality care for young children (see Table 1). It illustrates how existing programmes can be enhanced to be more comprehensive in addressing young children’s needs.

The Framework promotes the use of local assets, adaptation to the local context, and ownership at community level. It describes the foundations, actions and government leadership that must be in place for all children to reach their potential (1). Translating the NCF into policy and practice in LMICs is a prerequisite for achieving progress toward child health and development and is fundamental to several Sustainable Development Goals. While progress has been made in child survival with a 53% reduction in under five child mortality from 1990 to 2015, under five mortality remains unacceptably high with more than 5 million children dying before their 5th birthday in 2020 (5).

The Early Childhood Development (ECD) Index has been designed to measure progress and generate action toward the SDGs, particularly SDG 4.2 of ensuring that all girls and boys have access to quality ECD, care and pre-primary education by 2030 (6). This has revealed the extent of the global ECD challenge with recent analysis of national survey data from 63 LMICs finding 38.7% of children in South and East Africa to have suspected developmental delay and 32.6% in South Asia (7). The causes of developmental delay are closely linked to poverty, including poor nutrition, recurrent infectious disease episodes, lack of stimulation and inadequate care (8, 9). National surveys in LMICs shed further light on the challenges families are facing in providing the nurturing caring required for healthy ECD.

TABLE 1 Detailed components of the nurturing care framework (1).

Good health:	Adequate nutrition:	Responsive caregiving:	Opportunities for early learning:	Security and safety:
a. Family planning	a. Maternal nutrition	a. Skin-to-skin contact	a. Information, support and counseling about opportunities for early learning, including the use of common household objects and home-made toys	a. Birth registration
b. Immunization for mothers and children	b. Support for early initiation, exclusive breastfeeding and continued breastfeeding after 6 months	b. Kangaroo care for low-birthweight babies	b. Play, reading and story-telling groups for caregivers and children	b. Provision of safe water and sanitation
c. Prevention and cessation of smoking, alcohol and substance use	c. Support for appropriate complementary feeding and for transition to a healthy family diet	c. Rooming-in for mothers and young infants and feeding on demand	c. Book sharing	c. Good hygiene practices at home, at work and in the community
d. Prevention of mother-to-child transmission of HIV	d. Micronutrient supplementation for mother and child, as needed	d. Responsive feeding	d. Mobile toy and book libraries	d. Prevention and reduction of indoor and outdoor air pollution
e. Support for caregivers' mental health	e. Fortification of staple foods	e. Interventions that encourage play and communication activities of caregiver with the child	e. Good-quality day care for children, and pre-primary education	e. Clean environments free of hazardous chemicals
f. Antenatal and childbirth care	f. Growth monitoring and promotion, including intervention and referral when indicated	f. Interventions to promote caregiver sensitivity and responsiveness to children's cues	f. Storytelling of elders with children	f. Safe family and play spaces in urban and rural areas
g. Prevention of preterm births	g. Deworming	g. Support for caregivers' mental health	g. Using local language in children's daily care	g. Prevention of violence by intimate partners and in families, as well as services for addressing it
h. Essential care for new-born babies, with extra care for small and sick babies	h. Support for appropriate child feeding during illness	h. Involving fathers, extended family and other partners		h. Social care services
i. Kangaroo care for low-birthweight babies	i. Management of moderate and severe malnutrition as well as being overweight or obese	i. Social support from families, community groups and faith communities		i. Cash or in-kind transfers and social insurance
j. Support for timely and appropriate care seeking for sick children				j. Supporting family care and foster care over institutional care
k. Integrated management of childhood illness				
l. Early detection of disabling conditions (such as problems with sight and hearing)				
m. Care for children with developmental difficulties and disabilities				

These challenges are particularly stark and have a clear social gradient, with between 5–17% and 7–29% of under-5 children from low-income families left alone for at least 1 day a week in East and Southern Africa and in South Asia, respectively (10). Furthermore, the World Bank estimates that 72% of all children below primary-school-entry age need some form of childcare globally, however 59% of these children do not currently have access (11).

Changing working patterns driven by migration to urban areas is exacerbating these challenges as low-income families, particularly women, must work long hours outside the home and this has created demand for non-parental childcare in many LMICs (12, 13). There are limited options for childcare as some women either take their children to work or leave them at home alone (14, 15). This undermines child health, already compounded because of their living conditions and inadequate

access to quality health care faced by the urban poor (16–19), with greater exposures to injuries (10, 20), poor nutrition (13, 21, 22), poor hygiene (23, 24) and low uptake of child health programs (25–27). This is demonstrated through statistics that only 58% of children in Kenya's slums are immunized (28), with particularly low uptake among rural to urban migrants (29). The Kenyan government use a community health volunteers (CHVs) model to provide care and support for families through health and nutrition screening within each county (30). These CHVs are supervised by community health assistants (CHAs), who have received a formal health and nutrition training. Given the increased global focus on nurturing care, and the urgent need to address healthy ECD, understanding how LMIC governments have established policy frameworks to steer the response to these challenges is important. Naumen et al. emphasize the 3-fold need for policies on ECD, to (i) present a vision for the country's children (ii) clarify the responsibility of different ministries and actors, with particular importance given to the multi-sectoral responses needed, and (iii) to define roles for public and private sectors, particularly in relation to funding and service provision (31).

In Kenya, child health and development face many challenges particularly in deprived urban neighborhoods and remote rural communities. Nationally, under five mortality remain stubbornly high with 41.9 deaths per 1,000 live births in 2020, and 19.4% of under 5s are stunted (5, 32). As the NCF is a relatively new framework, many countries including Kenya, are now in the process of using it to guide and strengthen their ECD policies and practices. Kenya was one of the first countries in sub-Saharan Africa to approve an integrated National ECD Policy Framework in 2006. The policy and subsequent Service Standard Guidelines aimed to serve as a coordination mechanism, defining roles of various stakeholders across government, agencies, communities, and parents (31). Promulgation of the Constitution in 2010 created a decentralized system of 47 counties. Counties were assigned the responsibility of early childhood education, and it has been argued that since then, the ECD sector in Kenya has not received adequate attention (33). The 2010 Constitution created a two-tier system of governance—national and devolved county governments that are distinct and interdependent. This governance landscape requires a paradigm shift in integrated development planning, which brings together the different development sectors who work together to produce 4-year County Integrated development Plans (CIDPs). The government of Kenya provides the greatest share of resources for the implementation of the CIDPs through the “equitable revenue share” based on weighted criteria for allocation across Counties based on poverty rate, population and area size. Further resources come from local levies (e.g., Road Maintenance Levy Fund) and loans and grants from development partners (34).

To establish the extent to which government policies and plans address the components of the NCF, particularly in relation to center-based childcare, and explore policy makers' views, we carried out a policy review as part of a study that explored feasible models to improve the quality of center-based childcare in informal settlements in Nairobi (35). The objectives for the review include: (i) To identify the extent to which the NCF is addressed in Kenyan national policies and county government plans; (ii) To identify the extent and characteristics of childcare center provision in Kenya as specified in county-level plans; and (iii) To explore, from the perceptions of decision-makers, the extent to which nurturing care, including quality center-based childcare is addressed within national and county level policies and plans.

Methods

A search strategy was formulated to identify the extent to which the NCF is addressed in Kenyan national policies and county government plans. Following the analysis of the policies and plans, qualitative interviews were conducted with national policy makers and county-level decision-makers to explore the extent to which nurturing care, including quality center-based childcare has been addressed within national and county level policies and plans.

Search strategy

As the components of the NCF focus on multiple sectors including health, nutrition, education, labor, finance, water and sanitation, and social and child protection (1), our search strategy also focused on identifying policies across corresponding sectors within the government of Kenya. We searched for CIDPs from all 47 of Kenya's counties.

Step 1—Searching

To retrieve policy documents, the first author (MA-O) conducted a primary search in the e-repository for Kenyan government documents, government ministries (health; education; gender, children, and social services; labor, social security and services; home affairs) websites, county websites and national councils' websites among others. Search terms used include policy (policies, guidelines, Acts, standards) and ECD (early childhood care, early childhood education, early childhood education center, early learning) and center-based care (daycare, daycare centers, childcare centers, pre-school) and terms related to under-fives. We limited the search to policy documents published since 2010 when the Kenya Constitution was promulgated and the ECD function devolved to county governments.

Inclusion and exclusion criteria

We included national policy documents and county integrated development plans (CIDPs) that addressed issues relating to ECD and components of the NCF (“good health”, “adequate nutrition”, “responsive caregiving”, “opportunities for early learning” and “safety and security”) for children under 5 years. These documents were published in English spanning from 2010 onwards (the Kenya constitution was promulgated and the ECD function devolved to county governments). All the most recent 4-year CIDPs from all counties in Kenya were included. Policy documents that focused on topical issues other than ECD and components of the NCF, those focusing on children above age 5 and published prior to, and beyond 2010, were excluded including those published in languages other than English.

Step 2—Sifting and sorting

The titles of all policy documents were first scanned and reviewed by two members of the project team (MA-O and HE), to remove duplicates and other unrelated documents that did not address the objective of the review. Policy documents meeting the inclusion criteria were labeled “yes” and those not meeting the inclusion criteria were labeled “no”. To avoid incorrectly excluding policy documents that met the inclusion criteria, we erred on the side of caution: when in doubt we reviewed the full text of policy documents and discussed it with some of the review team based in Kenya (MN, GEO, KO, PK-W, and MM). Any disputes were resolved after consultation with senior members of the team (PG, RH and HE) as well as a policy expert in Kenya (GEO).

Step 3—Data extraction and analysis

Eleven members of the review team (MA-O, MN, PK-W, KO, IC, MW, RM, LO, HE, MM, and EM) initially extracted policy details including title and year of publication, aims/goals, focus on center-based care, ECD and related terms, urban poor/informal settlements, components of the NCF as detailed in Table 1. The eleven-member team met regularly to review the data extraction process, resolve challenges, and clarify any issues arising from the documents being extracted.

To comprehensively extract policy documents to reflect the NCF components addressed by each of the policy documents, a coding key was developed to match each detailed element listed under the five main NCF components (*good health, adequate nutrition, responsive caregiving, opportunities for early learning, and security and safety*) as detailed in Table 1, with each element listed under the NCF components labeled with the letters of the alphabets. Two tables were created to capture detailed data on each element listed under the NCF components

(see [Supplementary materials 1, 2](#)), with a corresponding coding table for both national policies and CIDPs (see [Tables 2, 3](#)), that captured whether these elements were addressed in the respective policy documents. Coding keys were used to determine whether the elements listed under each NCF components have been fully addressed (++), partially addressed (+) or not addressed (x) in the policy documents included. This approach to coding was necessary as it helped to quickly identify all the gaps in the included policy documents with respect to the components of the NCF.

Policy/decision-maker interviews

We conducted individual qualitative interviews with policy and decision-makers at national, Nairobi County and sub-County (Makadara and Ruaraka) levels to understand the policy and planning context, the extent to which the components of the NCF have been addressed within policies and plans and any perceived gaps or challenges to their inclusion in future. Nairobi County was the only county involved in the qualitative interviews as this policy review has been nested within a larger feasibility study being conducted in Nairobi (35). This interview study has been approved by Amref Health Africa’s Ethics and Scientific Review Committee (Ref: P7802020) and the University of York Health Sciences Research Governance Committee (Ref: HSRGC). All participants provided their written informed consent to participate in this study including to audio-record interviews. Interviews were conducted in English.

Participants were selected using purposive sampling including national policy makes and county-level decision-makers of different levels of seniority within departments that focus on child health, child protection, development, and early years education. Both telephone and face-to-face interviews were utilized based on participant’s availability, prevailing COVID-19 restrictions, and convenience. All the face-to-face interviews were conducted at the participants’ workplace and the telephone interviews were held at a time convenient to the participant. A semi-structured interview guide was used to facilitate the interviews and included views on ECD and its perceived importance to government policy, details of any policies, plans or guidance at national and county level relating to child health and ECD and the extent they aligned to the NCF domains, the age groups addressed and any specific focus on childcare centers for vulnerable communities. The questions were open-ended and allowed flexibility to focus on areas of relevance to the participants. The interviews were conducted by LO, PA, MN, KO and PW, all of whom had experience in qualitative methods. Before the interviews, the researchers introduced themselves to the participants, explaining the objectives of the study.

An initial sample size of $n = 20$ participants were anticipated and interviews continued until data saturation was achieved

(thus as interviews progressed, emerging themes were discussed among interviewers periodically and agreement was reached on the sufficiency of data collected to answer the objectives set for the interviews). The audio recorded interviews were transcribed soon after the interviews, anonymized and combined with the notes taken by the interviewers during the interview sessions. Due to time constraints, the transcripts were not returned to the participant for comments and/or corrections. However, findings were shared at engagement events with policy and decision makers.

Qualitative analysis

The analysis process followed the stages outlined in the Framework Approach (102) with the NCF used as the main framework to guide analysis. Given the multiple interviewers, the initial analysis process was conducted as a group activity with team members coding transcripts and identifying common emerging issues. These discussions informed the subthemes emerging within each of the NCF domains. Additional themes on the challenges, successes and future plans in policy development and implementation in relation to the NCF were included within the framework. The final framework was used within NVivo 2020 where transcripts and notes were coded and grouped into the themes by authors PA and HE. Following coding of the first three transcripts, we checked consistency between the two coders and agreed how to resolve any differences. Summaries were written under each theme highlighting similarities and differences in respondents' views across sector and seniority level. To further understand the challenges, successes and future plans of policy and implementation under each of the NCF domains, the Jaccards' similarity coefficient (103) function in NVivo 2020 was used to assess similarities between the themes being compared (where 0 = least similar, 1 = most similar). The coefficient shows the similarity index between the themes. Jaccards' coefficient only counts the true positives (similar coding) in the groups being compared. This quantification of the relationships allowed us to further explore the underlying reasons for coverage of each of NCF domains by different policy and decision makers at different levels.

Results

Characteristics of policy documents identified

A total of 127 policy documents were identified and retrieved from the government e-repository and county websites. Of these 127 documents, $n = 15$ duplicates

were removed, $n = 21$ were excluded after title screening and $n = 91$ were assessed against the inclusion and exclusion criteria. More than half ($n = 66$) met the inclusion criteria and $n = 25$ was excluded (see Figure 1). The 66 documents included 19 national policy documents that covered single ministries (health, education, labor, and social and child protection among others) and 47 CIDPs, see Tables 2, 3.

Decision-maker interview participant characteristics

Twenty key decision-maker interviews were conducted with various personnel at the national level and within Nairobi County as well as sub-County governments. Of the 20 interviews conducted, 11 were by telephone and nine were face to face interviews. Characteristics of the qualitative participants are given in Table 4.

Findings from policy data synthesis and policy/decision maker's reflections

National policies and CIDPs data synthesized mainly focused on information captured on children under 5 years however, majority of the CIDPs addressed age groups ranging from 0 to 5 years, 3 to 5, and 4 to 5 year olds (see Supplementary Tables 1, 2). Most plans in the CIDPs are targeted at pre-primary education, which mainly captured information on children from age 3–5 and sometimes 4–5 year olds. The national policies also have specific age ranges within their focus (e.g., the National Pre-Primary Education Policy addressed 4–5 year olds). These findings highlight the gaps in addressing the needs of children age 0–3 years in both national policies and CIDPs. Although the CIDPs captured information on almost all the components of the NCF, national policies predating 2018 had the most gaps in terms of the NCF components, see Table 2. Details regarding the coverage on the various components of the NCF have been discussed in turn below.

Coverage on “good health” components in national policies and CIDPs

National policies had a strong focus on breastfeeding, micronutrient supplements and management of malnutrition see Figure 2. Emphasis on care for children with disabilities, immunisations and prevention of substance abuse was also relatively strong. Care for new-borns, deworming, prevention of mother to child transmission (PMTCT) of HIV and

TABLE 2 National policy documents data coding table.

Kenyan National Policies	1. Good Health:	2. Adequate nutrition:	3. Responsive caregiving:	4. Opportunities for early learning:	5. Security and safety:
	A. Family planning B. Immunization for mothers and children C. Prevention and cessation of smoking, alcohol and substance use D. Prevention of mother-to-child transmission of HIV E. Support for caregivers' mental health F. Antenatal and childbirth care G. Prevention of preterm births H. Essential care for new-born babies, with extra care for small and sick babies I. Kangaroo care for low-birthweight babies J. Support for timely and appropriate care seeking for sick children K. Integrated management of childhood illness L. Early detection of disabling conditions (such as problems with sight and hearing) M. Care for children with developmental difficulties and disabilities	A. Maternal nutrition B. Support for early initiation, exclusive breastfeeding, and continued breastfeeding after 6 months C. Support for appropriate complementary feeding and for transition to a healthy family diet D. Micronutrient supplementation for mother and child, as needed E. Fortification of staple foods F. Growth monitoring and promotion, including intervention and referral when indicated G. Deworming H. Support for appropriate child feeding during illness I. Management of moderate and severe malnutrition as well as being overweight or obese	A. Skin-to-skin contact immediately after birth B. Kangaroo care for low-birthweight babies C. Rooming-in for mothers and young infants and feeding on demand D. Responsive feeding E. Interventions that encourage play and communication activities of caregiver with the child. F. Interventions to promote caregiver sensitivity and responsiveness to children's cues G. Support for caregivers' mental health. H. Involving fathers, extended family and other partners I. Social support from families, community groups and faith communities	A. Information, support and counseling about opportunities for early learning, including the use of common household objects and home-made toys B. Play, reading and story-telling groups for caregivers and children C. Book sharing D. Mobile toy and book libraries E. Good-quality day care for children, and pre-primary education F. Storytelling of elders with children G. Using local language in children's daily care	A. Birth registration B. Provision of safe water and sanitation C. Good hygiene practices at home, at work and in the community D. Prevention and reduction of indoor and outdoor air pollution E. Clean environments free of hazardous chemicals F. Safe family and play spaces in urban and rural areas G. Prevention of violence by intimate partners and in families, as well as services for addressing it H. Social care services I. Cash or in-kind transfers and social insurance J. Supporting family care and foster care over institutional care
The National Children's Policy (36)	A+ B+ C++ D+ Ex F+ Gx Hx Ix Jx K+ Lx M+	Ax B+ Cx D+ Ex Fx Gx Hx Ix	Ax Bx Cx Dx Ex Fx Gx Hx I++	N/A	A++ B+ C+ Dx Ex Fx Gx Hx Ix J++
The framework for the national child protection system for Kenya (37)	Ax B+ C+ Dx Ex Fx Gx Hx Ix J+ Kx Lx Mx	N/A	Ax Bx Cx Dx Ex Fx Gx Hx I++	Ax Bx Cx Dx E+ Fx Gx	Ax B+ Cx Dx Ex Fx G+ H+ Ix Jx
Kenya National Social Protection Policy (38)	N/A	N/A	N/A	N/A	Ax Bx Cx Dx Ex Fx Gx H+ I+ J+

(Continued)

TABLE 2 (Continued)

Kenyan National Policies	1. Good Health:	2. Adequate nutrition:	3. Responsive caregiving:	4. Opportunities for early learning:	5. Security and safety:
National School Health Strategy Implementation Plan (39)	Ax Bx C+ Dx Ex Fx Gx Hx Ix J+ Kx Lx M+	N/A	N/A	N/A	Ax B+ C+ Dx Ex Fx Gx Hx Ix Jx
Laws of Kenya, Children Act, Chapter (40)	Ax B+ C+ Dx Ex Fx Gx Hx Ix Jx Kx Lx Mx	Ax Bx C+ Dx Ex Fx Gx Hx Ix	N/A	Ax B+ Cx Dx E+ Fx Gx	A++ Bx Cx Dx Ex Fx G+ Hx Ix Jx
Kenya Health Policy (41)	Ax Bx C+ Dx Ex Fx Gx Hx Ix Jx Kx Lx Mx	Ax B+ Cx D+ Ex Fx Gx Hx I+	N/A	N/A	Ax, Bx C+ Dx Ex Fx Gx, H+ Ix Jx
A national framework and plan of action for implementation of Integrated Community case Management in Kenya (42)	Ax B+ Cx Dx Ex Fx Gx Hx Ix Jx Kx Lx Mx	Ax B+ C+ Dx Ex Fx Gx Hx Ix	A+ Bx Cx Dx Ex Fx Gx Hx Ix	N/A	A++ B+ C+ Dx Ex Fx Gx Hx Ix Jx
National Standards for Best Practice in Charitable Children's Institutions (43)	Ax B+ Cx Dx Ex Fx Gx Hx Ix Jx Kx L+ M+	Ax Bx Cx Dx Ex F+ Gx Hx Ix	Ax Bx Cx Dx Ex Fx Gx H+ Ix	A+ B+ Cx Dx E+ Fx Gx	Ax B+ C+ Dx Ex Fx Gx Hx Ix Jx
National Maternal, Infant and Young Child Nutrition Policy Guidelines (44)	A+ B+ Cx D++ Ex F+ G+ H+ I++ J+ Kx L+ M+	A++ B+ C++ D++ Ex F+ Gx H+ I+	A++ B++ C++ D++ Ex Fx Gx H+ I++	N/A	Ax B+ Cx Dx Ex Fx Gx Hx Ix Jx
The National Plan of Kenya against sexual exploitation of children (45)	N/A	N/A	Ax Bx Cx Dx Ex Fx Gx H+ I+	N/A	Ax Bx Cx Dx Ex Fx G+ Hx Ix
Kenya National Nutrition Action Plan (46)	N/A	A+ B+ Cx D+ E+ F+ Gx Hx I+	N/A	N/A	Ax B+ Cx Dx Ex Fx Gx Hx Ix Jx
Policy guidelines for management of diarrhoea in children below 5 years in Kenya (47)	N/A	Ax B+ Cx D+ Ex Fx Gx H++ I+	Ax Bx Cx Dx Ex Fx Gx Hx I+	N/A	Ax B+ C+ Dx Ex Fx Gx Hx Ix Jx
Guidelines for the Alternative Family Care of Children in Kenya (48)	Ax Bx Cx Dx Ex Fx Gx Hx Ix J+ Kx Lx M+	N/A	N/A	N/A	Ax Bx Cx Dx Ex Fx Gx Hx I+ J+
National Plan of Action for Children in Kenya (49)	N/A	A+ B+ C+ D+ E+ Fx Gx Hx I+	N/A	N/A	Ax B+ C+ Dx Ex Fx Gx H+ Ix Jx
Kenya Reproductive, Maternal, Newborn, Child and Adolescent Health Investment Framework (50)	A++ Bx Cx Dx Ex Fx Gx Hx Ix Jx K+ Lx Mx	Ax B++ C+ D++ Ex Fx G+ Hx Ix	N/A	N/A	A+ Bx Cx Dx Ex Fx Gx Hx Ix Jx
Footprints Children's Home Child Protection Policy (51)	Ax Bx C+ Dx Ex F+ Gx Hx Ix Jx K+ Lx M+	N/A	N/A	N/A	A++ B+ Cx Dx Ex Fx G+ Hx Ix J+
Sector Policy for Learners and Trainees with Disabilities (52)	Ax, Bx Cx Dx Ex Fx Gx Hx Ix Jx Kx Jx L+ M+	N/A	N/A	N/A	Ax, B+ Cx Dx Ex Fx Gx Hx Ix Jx
National Pre-Primary Education Policy Standard Guidelines (53)	Ax B+ Cx Dx Ex Fx Gx Hx Ix Jx K+ L+ M++	Ax Bx Cx D+ Ex F+ G+ Hx Ix	Ax Bx Cx Dx Ex Fx Gx H+ I+	A+ B+ Cx Dx E++ Fx Gx	Ax B+ C+ Dx Ex F+ G++ Hx Ix Jx
Kenya Community Health Policy (54)	A+ B+ C+ Dx E+ F+ Gx H+ Ix J+ Kx L+ M+	A+ B++ Cx D+ E+ F+ Gx Hx I+	Ax Bx Cx D+ E+ Fx Gx Hx I+	A+ Bx Cx Dx Ex Fx Gx	Ax B+ C+ Dx E+ Fx Gx Hx Ix J+

++ , Mentioned and provided some details about plans or implementation.

+ , Just mentioned with no details on plans or implementation).

x , Not mentioned at all.

TABLE 3 Data coding for the components of the nurturing care framework as addressed in the Kenyan CIDPs.

Kenya's 47 County Integrated Development Plans (CIDPs) from 2018-2022/3	Good Health:	Adequate nutrition:	Responsive caregiving:	Opportunities for early learning:	Security and safety:
	A. Family planning B. Immunization for mothers and children C. Prevention and cessation of smoking, alcohol and substance use D. Prevention of mother-to-child transmission of HIV E. Support for caregivers' mental health F. Antenatal and childbirth care G. Prevention of preterm births H. Essential care for new-born babies, with extra care for small and sick babies I. Kangaroo care for low-birthweight babies J. Support for timely and appropriate care seeking for sick children K. Integrated management of childhood illness L. Early detection of disabling conditions (such as problems with sight and hearing) M. Care for children with developmental difficulties and disabilities	A. Maternal nutrition B. Support for early initiation, exclusive breastfeeding and continued breastfeeding after 6 months C. Support for appropriate complementary feeding and for transition to a healthy family diet D. Micronutrient supplementation for mother and child, as needed E. Fortification of staple foods F. Growth monitoring and promotion, including intervention and referral when indicated G. Deworming H. Support for appropriate child feeding during illness I. Management of moderate and severe malnutrition as well as being overweight or obese	A. Skin-to-skin contact immediately after birth B. Kangaroo care for low-birthweight babies C. Rooming-in for mothers and young infants and feeding on demand D. Responsive feeding E. Interventions that encourage play and communication activities of caregiver with the child. F. Interventions to promote caregiver sensitivity and responsiveness to children's cues G. Support for caregivers' mental health H. Involving fathers, extended family and other partners I. Social support from families, community groups and faith communities	A. Information, support and counseling about opportunities for early learning, including the use of common household objects and home-made toys B. Play, reading and story-telling groups for caregivers and children C. Book sharing D. Mobile toy and book libraries E. Good-quality day care for children, and pre-primary education F. Storytelling of elders with children G. Using local language in children's daily care	A. Birth registration B. Provision of safe water and sanitation C. Good hygiene practices at home, at work and in the community D. Prevention and reduction of indoor and outdoor air pollution E. Clean environments free of hazardous chemicals F. Safe family and play spaces in urban and rural areas G. Prevention of violence by intimate partners and in families, as well as services for addressing it H. Social care services I. Cash or in-kind transfers and social insurance J. Supporting family care and foster care over institutional care
Baringo (55)	A+ B+ Cx D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B+ C+ D+ Ex F+ G+ Hx I++	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E+ Fx Gx	A++ B++ C+ D++ E+ F+ G+ H+ I++ Jx
Bomet (56)	A++ B+ Cx D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ B+ Cx D+ Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx Gx H+ I+ Jx
Bungoma (57)	A++ B+ C+ Dx Ex F++ Gx H+ Ix Jx Kx Lx Mx	Ax B+ C+ D++ Ex F+ G+ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ F+ G+ H++ I+ Jx

(Continued)

TABLE 3 (Continued)

Kenya's 47 County Integrated Development Plans (CIDPs) from 2018-2022/3	Good Health:	Adequate nutrition:	Responsive caregiving:	Opportunities for early learning:	Security and safety:
Busia (58)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B+ C+ D++ Ex F+ G+ Hx I++	Ax Bx Cx D++ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ I++ Jx
Elgeyo/Marakwet (59)	A++ B+ C+ D++ Ex F++ Gx H+ Ix Jx Kx Lx Mx	A+ B+ C+ D++ Ex F++ G+ Hx I+	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ D+ E++ Fx G+ H+ I+ Jx
Embu (60)	A++ B+ C+ D++ E+ F++ Gx Hx Ix Jx Kx Lx Mx	A+ Bx Cx D+ Ex F++ Gx Hx I++	Ax Bx Cx D+ E+ F+ G+ Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ F+ G+ H+ I+ Jx
Garissa (61)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx K+ Lx Mx	A+ Bx Cx D+ Ex F++ Gx Hx I++	Ax Bx Cx D+ E++ F++ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	A++ B++ C+ D++ E+ F++ G+ H+ I++ Jx
Homa Bay (62)	A++ B+ Cx D+ Ex Fx Gx H++ Ix J+ Kx Lx Mx	Ax B++ C+ D+ Ex F+ G++ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ I+ Jx
Isiolo (63)	A++ B+ Cx D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B++ C+ D++ E+ F+ G++ Hx Ix	Ax Bx Cx D++ E+ F+ Gx Hx I+	A+ B+ Cx D+ E++ Fx Gx	A++ B++ C+ Dx E+ F+ G+ H++ I+ Jx
Kajiado (64)	A++ B+ C+ Dx Ex F++ Gx Hx Ix Jx K+ Lx Mx	A+ B+ Cx D+ Ex F++ G+ Hx I++	Ax Bx Cx D+ E+ Fx Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B+ C+ D+ E+ Fx G+ H++ I++ Jx
Kakamega (65)	A++ B+ C+ D+ Ex F++ G+ Hx Ix Jx Kx Lx Mx	Ax B+ Cx D+ Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C++ D+ E+ Fx G+ H++ I++ Jx
Kericho (66)	A++ B+ Cx D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ Bx Cx D+ Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H++ I++ Jx
Kiambu (67)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx LxM+	Ax B+ C+ D+ Ex F++ G+ Hx I+	Ax Bx Cx D++ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E+ Fx Gx	Ax B++ C++ D+ E++ F+ G+ H+ I+ Jx
Kilifi (68)	A++ B+ C+ Dx Ex F+ Gx Hx Ix Jx Kx Lx Mx	A+ Bx C+ D+ Ex F+ Gx Hx I+	Ax Bx Cx D+ E+ Fx Gx Hx Ix	A+ B+ Cx D+ E+ Fx Gx	A++ B+ C+ D+ E+ Fx G+ H++ I+ Jx
Kirinyaga (69)	A++ B+ C++ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ B+ C+ Dx Ex F+ Gx Hx I+	Ax Bx Cx D+ E+ Fx Gx Hx Ix	A+ B+ Cx D+ E+ Fx Gx	Ax B+ C+ D+ E+ Fx G+ H+ I+ Jx
Kisii (70)	A++ B+ Cx D++ Ex F+ Gx H+ Ix Jx Kx Lx Mx	A+ Bx Cx D++ Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ Fx Gx Hx Ix	A+ B+ C+ D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx Gx H+ I+ Jx
Kitui (71)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ B++ C+ D+ E+ F+ G++ Hx I+	Ax Bx Cx D++ Ex Fx Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B+ C+ D+ E+ Fx G+ H+ I+ Jx
Kisumu (72)	Ax B+ C+ Dx Ex F+ Gx Hx Ix Jx Kx Lx Mx	A+ B+ Cx D+ Ex F+ G+ Hx I+	Ax Bx Cx D++ E+ Fx Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ I++ Jx

(Continued)

TABLE 3 (Continued)

Kenya's 47 County Integrated Development Plans (CIDPs) from 2018-2022/3	Good Health:	Adequate nutrition:	Responsive caregiving:	Opportunities for early learning:	Security and safety:
Kwale (73)	A++ B+ Cx D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx C+ Dx Ex F+ Gx Hx I+	Ax Bx Cx D+ E+ Fx Gx Hx Ix	A+ Bx Cx D+ E+ Fx Gx	Ax B+ Cx Dx E+ Fx G+ Hx I+ Jx
Laikipia (74)	A++ B+ C+ D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ Bx Cx D+ Ex F++ Gx H+ Ix	Ax Bx Cx D+ Ex F+ Gx Hx Ix	A++ Bx Cx D+ E+ Fx Gx	Ax B++ Cx D+ Ex Fx Gx H+ I+ Jx
Lamu (75)	A++ B+ Cx D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx C+ Dx Ex F+ Gx Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ C+ D+ E+ Fx Gx	Ax B++ Cx D+ Ex Fx Gx H+ I+ Jx
Machakos (76)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B+ Cx D+ Ex F++ Gx Hx I+	Ax Bx Cx D+ E+ Fx Gx Hx Ix	A+ Bx Cx D+ E+ Fx Gx	Ax B++ C+ D+ E+ F++ G+ H+ I+ Jx
Mandera (77)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx Cx Dx Ex F++ G+ Hx I+	Ax Bx Cx D+ E++ F++ Gx Hx Ix	A++ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ F+ G+ H+ I+ Jx
Makueni (78)	A++ B+ C+ Dx Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx Cx Dx Ex Fx G+ Hx Ix	Ax Bx Cx D+ Ex F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ Dx E+ Fx G+ Hx I+ Jx
Marsabit (79)	A+ B+ C+ D+ Ex F+ Gx Hx Ix Jx Kx Lx Mx	A+ Bx Cx Dx Ex F+ Gx Hx I+	Ax Bx Cx D+ E++ F+ Gx Hx Ix	A++ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ I+ Jx
Meru (80)	A++ B+ C+ D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx C+ D+ E+ F+ G+ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E+ Fx Gx	Ax B++ C+ D+ E+ Fx G+ Hx Ix Jx
Migori (81)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B+ Cx D+ Ex F+ G++ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B+ C+ D+ E+ Fx G+ H+ I+ Jx
Mombasa (82)	A++ B+ Cx Dx Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx C+ Dx Ex F+ G+ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B+ C+ D+ E+ Fx G+ H+ I+ Jx
Muranga (83)	A++ B+ C+ D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx C+ D+ Ex F+ G+ Hx I+	Ax Bx Cx D+ Ex F+ Gx Hx Ix	A+ Bx Cx D++ E+ Fx Gx	Ax B+ C+ D+ E+ F+ Gx H+ I+ Jx
Nairobi (84)	A++ B+ Cx Dx Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B+ Cx Dx E+ F+ G++ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B+ C+ D+ E+ F+ G+ H+ I+ Jx
Nakuru (85)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B+ Cx D+ Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E+ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ I+ Jx
Nandi (86)	A+ B+ C++ Dx Ex F++ Gx H+ I+ Jx Kx Lx Mx	Ax B+ Cx D++ Ex F+ Gx Hx Ix	Ax B+ Cx D++ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C++ D+ E+ F+ G+ H+ I+ Jx
Narok (87)	A++ B+ Cx D++ Ex F++ G+ Hx Ix Jx Kx Lx Mx	A+ Bx Cx Dx Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ F++ Gx Hx Ix	A+ Bx Cx D+ E+ Fx Gx	A++ B++ C++ D++ E++ F+ G+ H++ I++ Jx

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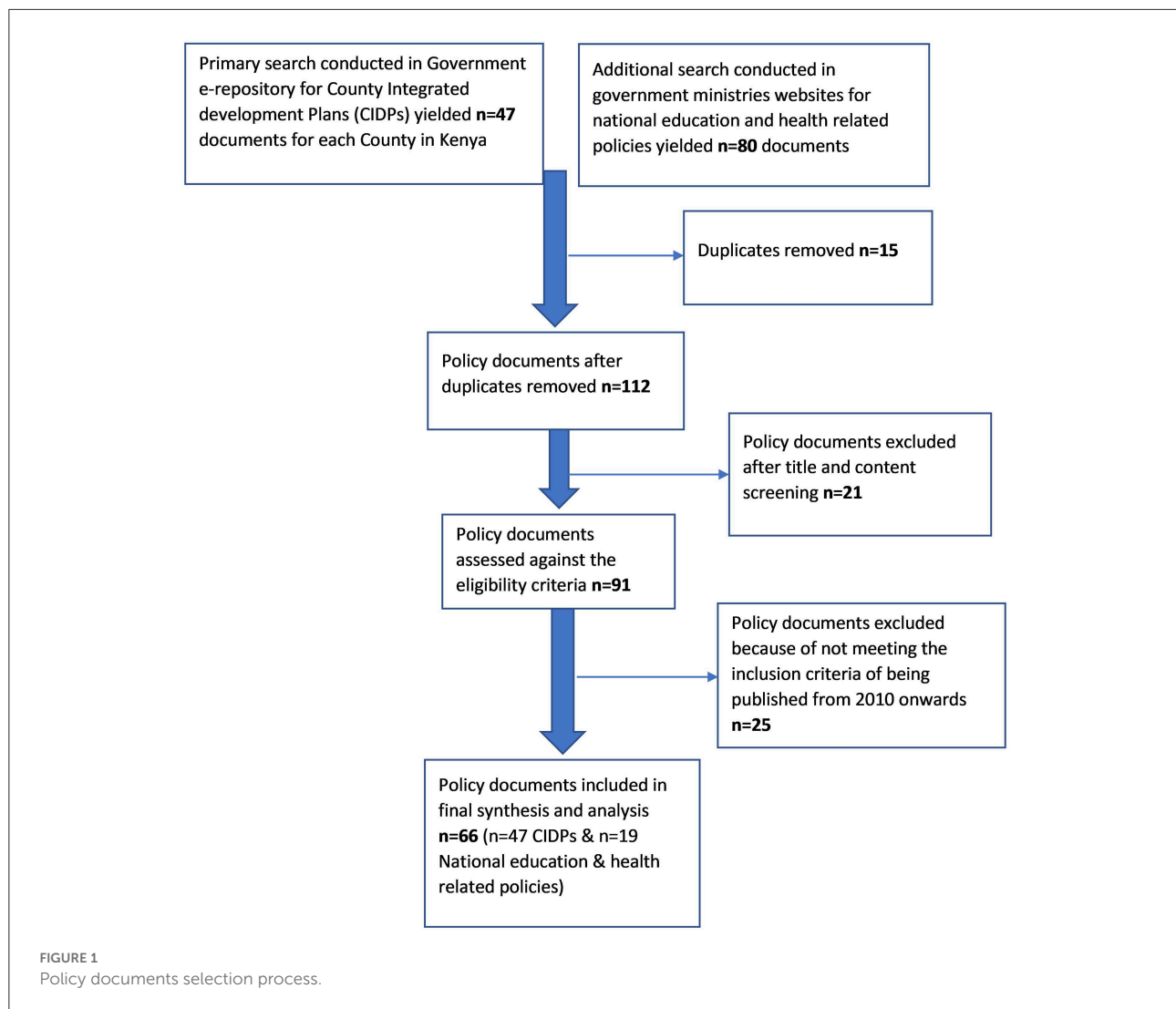
TABLE 3 (Continued)

Kenya's 47 County Integrated Development Plans (CIDPs) from 2018-2022/3	Good Health:	Adequate nutrition:	Responsive caregiving:	Opportunities for early learning:	Security and safety:
Nyamira (88)	A++ B++ C+ D+ Ex F++ Gx H+ Ix Jx Kx Lx Mx	A+ B++ C++ D+ Ex F+ Gx Hx Ix	Ax Bx Cx D++ E+ F+ Gx Hx Ix	A++ Bx Cx D+ E+ Fx Gx	Ax B++ C++ D+ Ex F+ G+ H++ I+ Jx
Nyandarua (89)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ B+ C+ D++ Ex F+ Gx Hx Ix	Ax Bx Cx D+ E+ F++ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C++ D+ E+ F+ Gx H+ I+ Jx
Nyeri (90)	A+ B+ C+ Dx Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx Cx Dx Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ Fx Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ Cx D+ E+ F+ Gx H+ I++ Jx
Siaya (91)	A++ B+ C+ D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ B+ C++ D+ Ex F+ G++ Hx Ix	Ax Bx Cx D++ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx Gx H+ Ix Jx
Samburu (92)	A+ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	A+ B+ Cx D++ Ex F++ G+ Hx Ix	Ax Bx Cx D++ E++ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	A++ B++ C+ D+ Ex Fx G+ H++ I++ Jx
Taita Taveta (93)	A++ B+ C+ D+ Ex F++ Gx Hx I+ Jx K+ Lx Mx	A+ B+ Cx D+ Ex F++ Gx Hx Ix	Ax B+ Cx D+ E+ F++ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ F+ G+ H+ I++ Jx
Tana River (94)	A++ B+ C+ D++ Ex F++ Gx H+ I+ Jx K++ Lx Mx	A+ B+ C++ D++ E+ F+ G+ Hx Ix	Ax B+ Cx D++ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	A++ B++ C+ D+ E+ F+ G+ H+ I+ Jx
Tharaka-Nithi (95)	A++ B+ C+ Dx Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx Cx D+ Ex Fx G+ Hx Ix	Ax Bx Cx D+ E++ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	A++ B++ C+ D+ E+ Fx G+ H+ I+ Jx
Trans Nzoia (96)	A++ B+ C+ D++ E+ F++ Gx H+ Ix Jx K+ L+ Mx	A+ Bx Cx Dx Ex F++ G+ Hx I+	Ax Bx Cx D+ E++ F+ G+ Hx Ix	A+ B+ Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ I++ Jx
Turkana (97)	A++ B+ C++ D++ Ex F+ Gx Hx Ix Jx Kx Lx Mx	A+ B+ C+ Dx Ex F+ G+ Hx I+	Ax Bx Cx D+ E+ F++ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ I++ Jx
Uasin Gishu (98)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx Cx D+ Ex Fx G+ Hx I+	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E++ Fx Gx	Ax B++ C+ D+ E+ Fx G+ H+ Ix Jx
Vihiga (99)	A++ B+ C+ D++ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax B+ C+ D+ Ex F+ Gx Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ Bx Cx D+ E+ Fx Gx	Ax B++ Cx D+ Ex F+ G+ H+ I++ Jx
Wajir (100)	A++ B+ Cx D++ Ex F++ Gx Hx Ix Jx K+ Lx Mx	Ax B+ C+ D+ E+ F+ G++ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	A++ B++ C+ D+ E+ F+ G+ H+ I+ Jx
West Pokot (101)	A++ B+ Cx D+ Ex F++ Gx Hx Ix Jx Kx Lx Mx	Ax Bx C+ D++ Ex F+ G+ Hx Ix	Ax Bx Cx D+ E+ F+ Gx Hx Ix	A+ B+ Cx D+ E++ Fx Gx	A++ B++ C+ D+ E+ F+ G+ H+ I++ Jx

++ , Mentioned and provided some details about plans or implementation.

+ , Just mentioned with no details on plans or implementation).

x , Not mentioned at all.



critically, support for caregivers' mental health were not strongly addressed within national policies.

Several areas that were addressed well in national policies received limited mention or budget allocation in the CIDPs see Figure 3. This was particularly evident in the "good health" domain where the early detection of and care for children with disabilities received relatively good coverage in national policies (64%) but was only mentioned in 2% of CIDPs and with no budget allocated.

Coverage on "adequate nutrition" components in national policies and CIDPs

Under the "adequate nutrition" domain, growth monitoring received the most focus, with 70% of the CIDPs mentioning this; however, there was limited attention given, particularly

within budgets to the other aspects of this domain, see Figures 4, 5.

Policy and decision-maker reflections on health and nutrition

The interviews with policy/decision-makers at both national and county level showed a high level of commitment to under five child health and nutrition. Consistently, respondents were able to identify and describe with the relevant policies in this area. The analysis of Jaccard's similarity coefficient confirmed that a high proportion of the text relating to nutrition and health was coded to "adequately addressed in policies and guidelines" (Jaccard's coefficient of over 0.5 for both nutrition and health, see Table 5). This was particularly the case for the county government officials who are responsible for implementation of policies. The health of children in the early years (0–3 years) was identified as being well-addressed in the policies,

TABLE 4 Qualitative interview participant characteristics.

Respondent	Sex	Seniority	Sector	Level
P1 (COP/PM/001)	Male	Junior official	Health	Sub-county
P2 (COP/PM/002)	Female	Senior official	Health	National
P3 (COP/PM/003)	Male	Junior official	Education	National
P4 (COP/PM/004)	Female	Junior official	Health	Sub-county
P5 (COP/PM/005)	Female	Junior official	Education	National
P6 (COP/PM/006)	Female	Junior official	Health	Sub-county
P7 (COP/PM/007)	Female	Senior official	Health	Sub-county
P8 (COP/PM/008)	Male	Senior official	Health	County
P9 (COP/PM/009)	Male	Senior official	Education	National
P10 (COP/PM/010)	Female	Senior official	Health	Sub-county
P11 (COP/PM/011)	Female	Junior official	Education	County
P12 (COP/PM/012)	Male	Senior official	Education	County
P13 (COP/PM/013)	Female	Senior official	Health	County
P14 (COP/PM/014)	Male	Senior official	Health	Sub-county
P15 (COP/PM/015)	Male	Junior official	Health	Sub-county
P16 (COP/PM/016)	Female	Junior official	Health	Sub-county
P17 (COP/PM/017)	Female	Senior official	Health	Sub-county
P18 (COP/PM/018)	Female	Junior official	Health	Sub-county
P19 (COP/PM/019)	Male	Junior official	Health	Sub-county
P20 (COP/PM/020)	Female	Junior official	Health	Sub-county

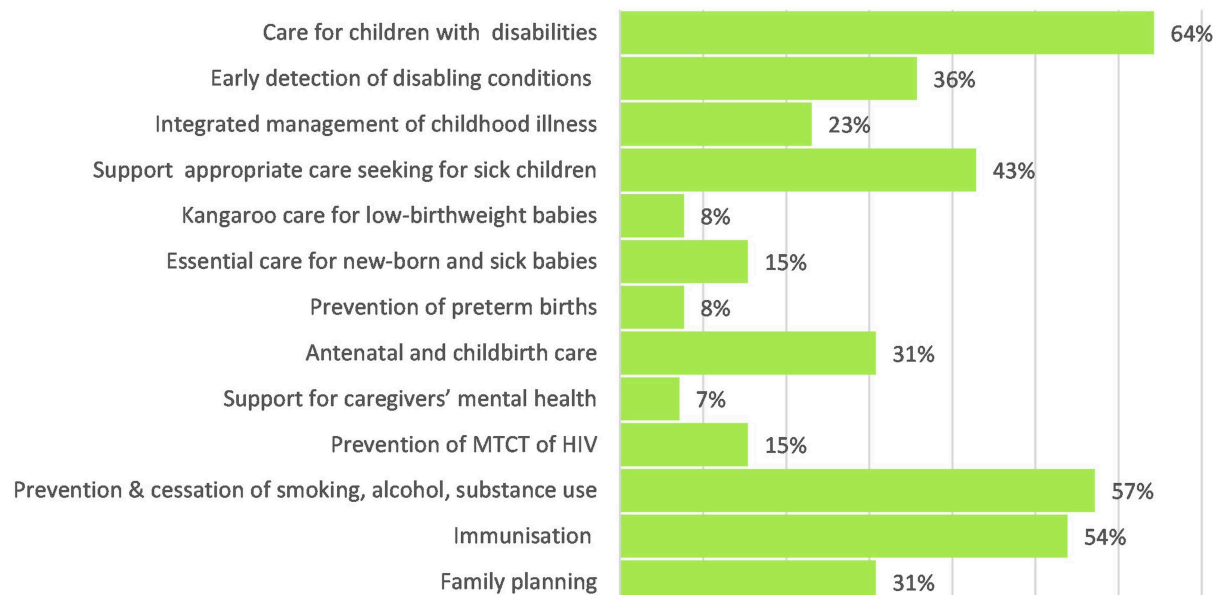


FIGURE 2
Coverage of "Good Health" within national policies.

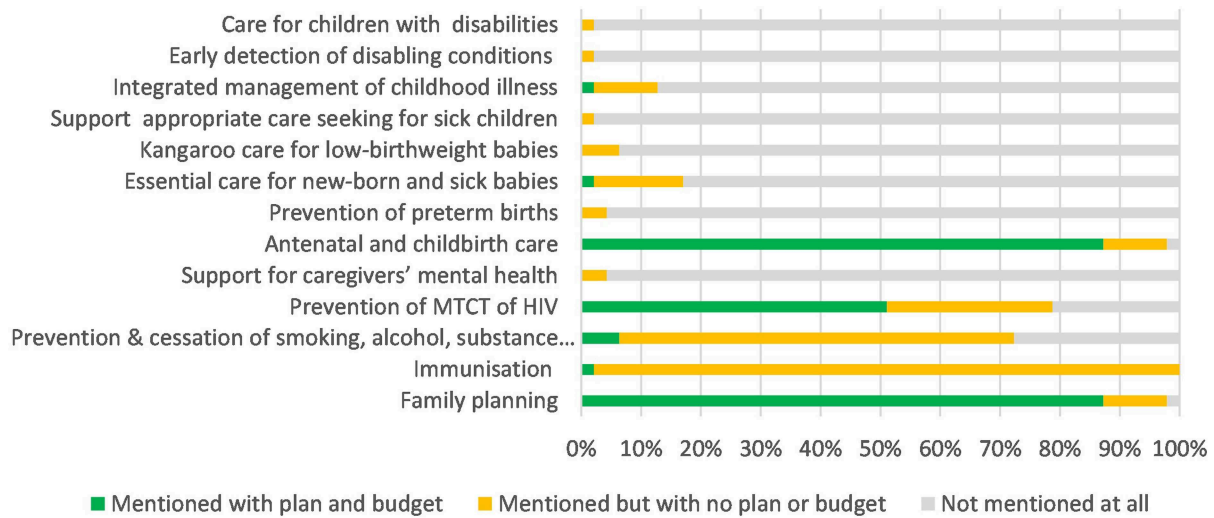


FIGURE 3
Coverage of "Good Health" within county integrated development plans.

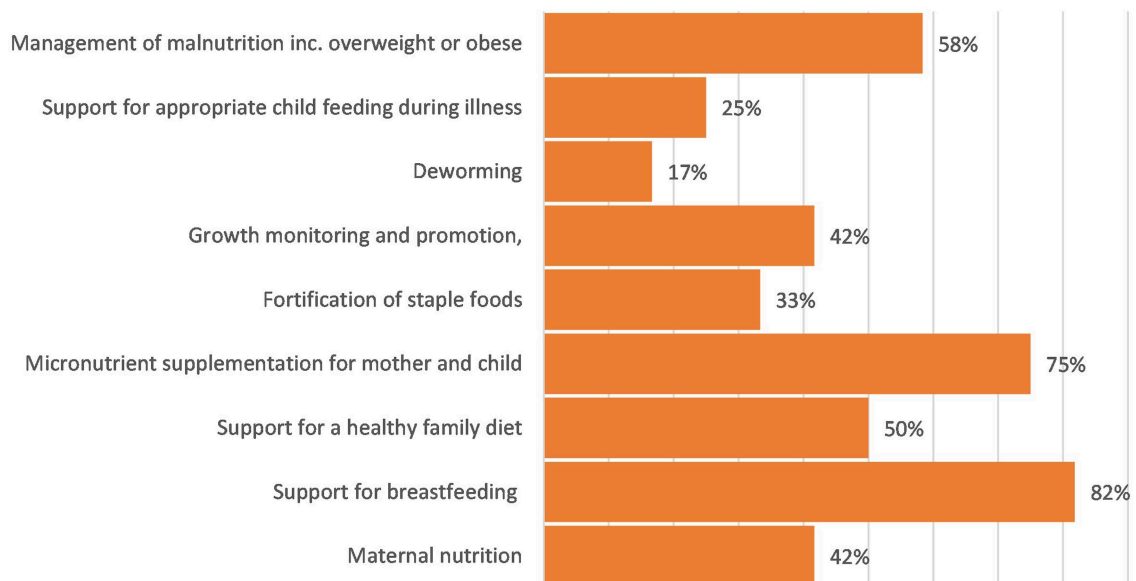


FIGURE 4
Coverage of "Adequate Nutrition" within national policy.

however with challenges in implementation, particularly beyond the health facility:

"You will find that 0-3 is mostly health. Okay that's where we talk about in fact, we talk about bringing the child for clinics, Vitamin A supplementation, nutritional assessments.

So, that aspect [health and nutrition] is well covered as long as the child is being brought to the facility. But more often than what we find after they finish their last vaccine at 18 months which is the second measles, a lot of caregivers don't bring the children for wellness check-ups." (COP/PM/002 Ministry of Health, National Government).

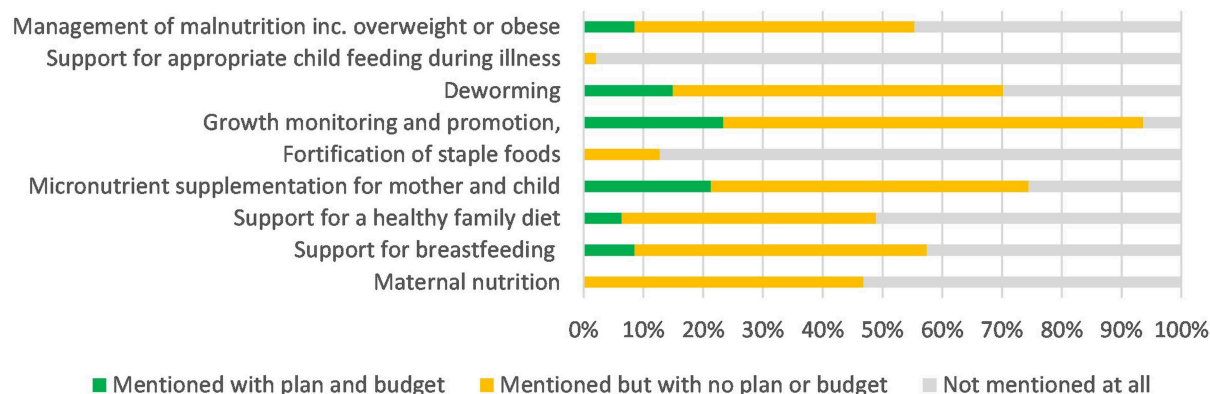


FIGURE 5
Coverage of "Adequate Nutrition" within county integrated development plans.

TABLE 5 Relationship between NCF components and policy-maker perceptions of policy gaps.

Component of NCF	Participants' responses	Jaccards' coefficient
Good health	Well-covered in policy and guidelines	0.71
Good health	Adequate implementation	0.63
Good health	Plans for future policies exist	0.63
Adequate nutrition	Well-covered in policy and guidelines	0.75
Adequate nutrition	Adequate implementation	0.75
Adequate nutrition	Plans for future policies exist	0.63
Responsive caregiving	Well-covered in policy and guidelines	0.38
Responsive caregiving	Adequate implementation	0.38
Responsive caregiving	Plans for future policies exist	0.25
Opportunities for early learning	Well-covered in policy and guidelines	0.50
Opportunities for early learning	Adequate implementation	0.50
Opportunities for early learning	Plans for future policies exist	0.38
Safety and security	Addressed gaps on policies made and guidelines	0.75
Safety and security	Addressed gaps on policy implementation	0.75
Safety and security	Plans for future policies	0.63

The green colour indicates gaps and future plans of the components of the NCF addressed in both national policies and CIDPs with coefficients >0.5 . The yellow colour indicates gaps and future plans of the components of the NCF addressed in both national policies and CIDPs with coefficients ≤ 0.5 .

Coverage on responsive caregiving components in national policies and CIDPs

Responsive caregiving received limited coverage within national policies and CIDPs, see Figures 6, 7. While social support from families, involving fathers and families received relatively high emphasis in national level policies, these areas were barely mentioned in the CIDPs, and had no budget allocations across the 47 counties. The only involvement of fathers mentioned in the qualitative interviews was in relation to the issuing of birth certificates, and not as a key aspect of responsive care giving.

Policy/decision-maker reflections on responsive caregiving components

Responsive feeding was one area that did have a budget allocation in 21% of the CIDPs. This reflects the general trend for a stronger focus on health and nutrition than early childhood development particularly for the youngest children. Several policy makers highlighted the challenges of addressing areas such as responsive care and other aspects of early childhood development as the issues often fell between sector ministries:

"I must agree we have had a challenge before because we really did not bring out the ECD the way it's supposed to be. You remember this thing cuts across two ministries. That's

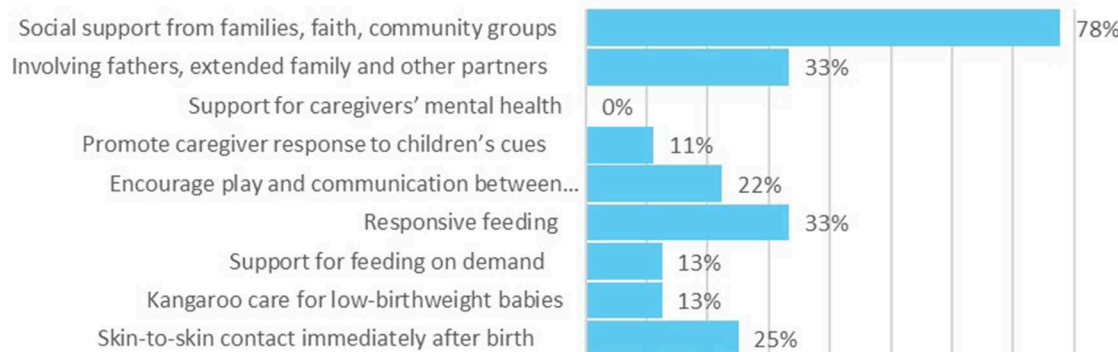


FIGURE 6
Coverage of "Responsive Caregiving" within national policies.

where the challenge is: there is the Ministry of Education, then there is the Ministry of Health. Education will say our work is to take care of these children in school from PP1 [pre-primary 1]. The Ministry of Health will just say we take care of them when they are at home. Under whose supervision are these centers [childcare centers for 3 years and below], we are not sure whether they are under the Ministry of Health or under the Ministry of Education and that's why we must have a policy in place." (COP/PM/008 Ministry of Health, County government).

National and County level decision-makers highlighted that the challenge of working across sectors was also experienced at County level:

"The gap which is there is the collaboration. This is lacking because they devolved the health and they devolved ECD" (Policy maker COP/PM/005 Ministry of Education, National).

Coverage on "opportunities for early learning" components in national policies and CIDPs

National policies indicated strong coverage for the sub-domains of play, reading and story-telling groups, support for early learning and quality day-care and pre-primary education, see Figure 8. These areas were also mentioned in CIDPs, see Figure 9, however <10% of CIDPs allocated budget for support for early learning.

Policy-maker reflections on the opportunities for early learning components

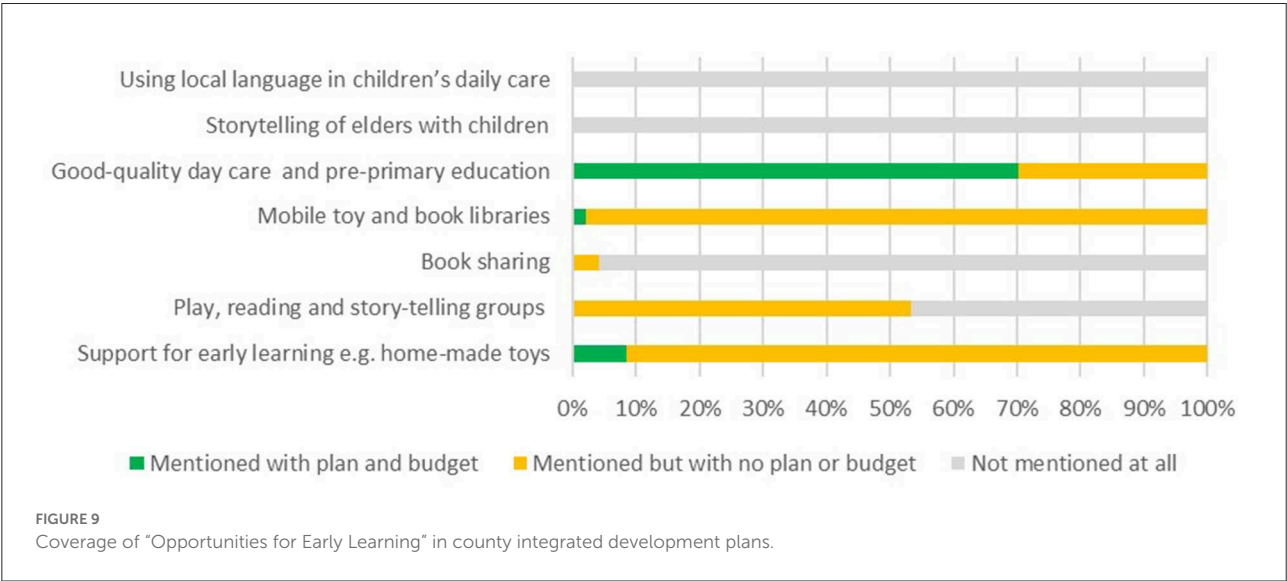
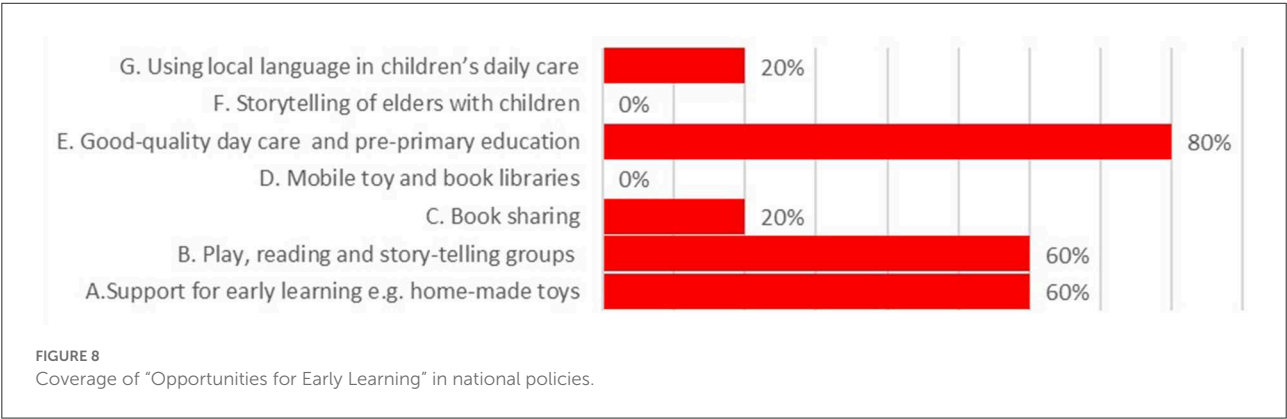
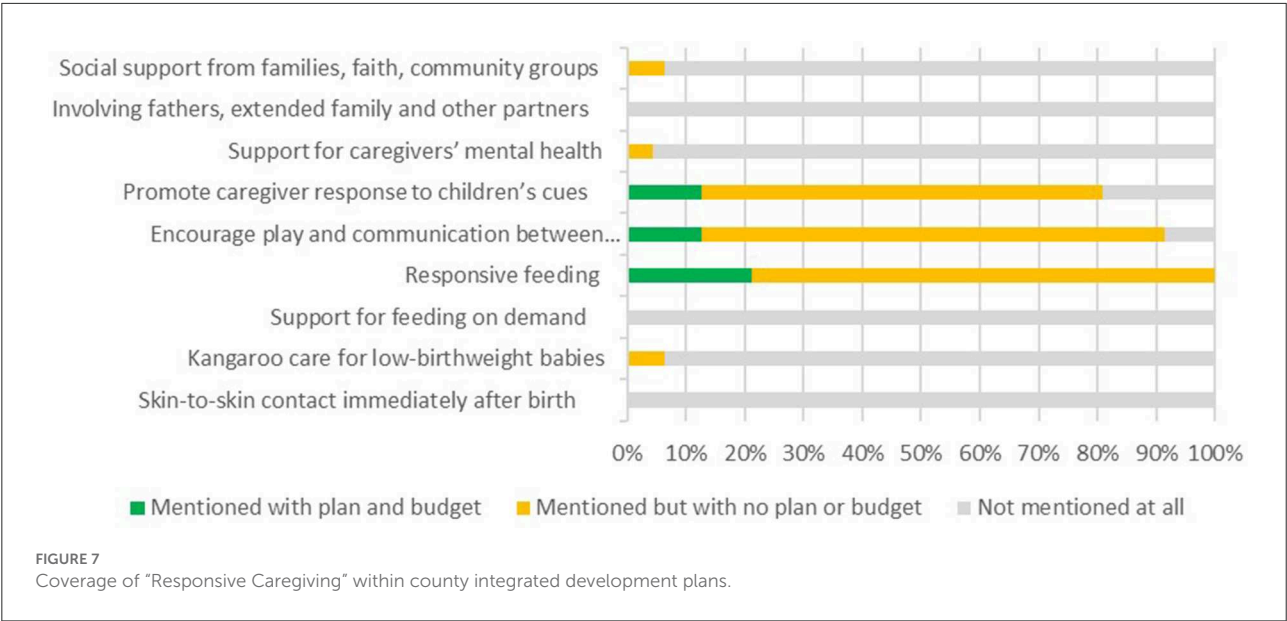
The high proportion of CIDPs allocating budget to day-care and pre-primary reflects the progress made on provision of ECDE centers. Across all 47 CIDPs we found

the implementation plans mentioned a total of 33,919 ECD centers, both public and private that are already up and running. Seven counties specified plans to increase the number of ECDE centers potentially adding a further 1,455 nationally. Policy and decision-makers, particularly at County and sub-County levels highlighted challenges with the regulation of the ECDE centers. This was seen as a particular problem in urban areas such as Nairobi where a plethora of private and NGO centers have sprung up to meet the high demand, yet lack of policies guiding engagement and regulation with the private sector undermines progress on implementation:

"We don't have that clear guideline on supporting private institutions, private institutions that are the majority" (COP/PM/012, Ministry of Education, County).

Attention to quality is a key aspect of this sub-domain, and it should be noted that of the 19 counties that specified a child: staff ratio in public sector ECDE centers, average ratio was one staff member to 47 children. The National Pre-Primary Education Policy Standard Guidelines (2018) specify no more than 25 children (age 4–5 yrs) per class so even for this age group, this ratio is clearly above the 13 recommended level. Several policy makers also indicated concerns about the quality of ECDE centers:

"They should offer directions especially on issues regarding nutrition and WASH. They should ensure they offer supportive supervision and mentorship and coaching to the managers of these ECDEs because most of them don't know which food to give the children that have been brought to their 403 facilities, issues to do with water, sanitation and hygiene is also not well looked up, and also during Covid, they broke covid protocols." (COP/PM/013 Ministry of Health, County government).



Most CIDPs did not specify the age-range of children targeted by these ECDE centers. In the CIDPs that did specify the target age for child attending the ECDE centers, none covered children from 0 to 3 years old. This reflects the national policy position with a National Pre-Primary Education Policy addressing the 4–5 year olds, but with little policy focus on those 0–3 years. While the provision of daycare and pre-primary education category scored highly in policy and CIDP coverage, it should be noted that this was limited to pre-primary ECDE centers, and there was very limited mention of center-based care for children 0–3 years. Participants in the qualitative interviews explained that provision for those children 0–3 years was at the discretion of each county:

“One of the roles of the county government is that, to undertake the early childhood education which now takes care of the three to five years. So, each and every county is supposed to factor that one as a budget proposition. The other area is that Nairobi County right now we have started talking about childcare centers” (COP/PM/012 Ministry of Education, County government).

While some counties, such as Nairobi are addressing the challenges of day-care provision for children 3 years and below, an interview with a sub-county level manager, indicates that there may well be a perception that children of this age are cared for at home by their mothers, and therefore center-based care is not necessary:

“I think mainly children under three years you know have not started school, most of them, so you find them at home. So we give them services at the household level this includes health education to 424 the mothers, treatment of minor illnesses at household level by the CHVs like diarrhea.” (COP/PM/007 Ministry of Health, sub-County government).

Furthermore, similar to the challenges of addressing the wider domains of responsive care and learning opportunities, was the lack of a clear ministerial remit for early years’ child-care centers. However, several policy makers alluded to recent activity to address this gap:

“Then the question is for example where are the early centres or centres for taking . . . your small baby to be taken care of? Under whose supervision are these centres? We are not sure whether they are under the Ministry of Health or under the Ministry of Education and that’s why we must have a policy in place. And it’s like a month ago the division brought together key partners from the Ministry of Education different departments nutrition, social services just to try and bring out– Come up with a policy that will address this early childhood development.” (COP/PM/008 Ministry of Health, County government).

Coverage on safety and security components in national policies and CIDPs

Within the “safety and security” domain, the provision of safe water and sanitation was given good consideration both within national policies (Figure 10) and with over 80% of CIDPs including specific plans and budgets to address this vital component (Figure 11). Few CIDPs specified plans and budgets for other key areas within this domain, with no budgets available for prevention and services to respond to violence within families or support for families to foster. Despite the lack of national policy focus on protecting young children from air pollution and hazardous chemicals, over 80% of CIDPs did mention these areas, although few (below 10%) had allocated any budget for them, see Figures 10, 11.

Decision-maker reflections on safety and security

Decision-makers highlighted the importance of water and sanitation which was consistent with the focus on this element within current policies and county budgets. County and sub-county policy makers within Nairobi frequently mentioned the difficulties of implementation of adequate water and sanitation for children within urban environments and the impact this would have on health. The other aspect of this domain that emerged as a priority for policy makers was the security of children within schools in terms of protection from violence, security and allowing safe places for play, again, this emerged as a particular issue for decision-makers within Nairobi:

“A safe environment at school is provided. We have taken care of them in school and also a very good environment for them to play” (COP/PM/012 Ministry of Education, County government).

Again, the challenges of providing this within urban environments was recognized:

“Learners should be in an enclosed place with security, you know the urban areas have a lot of 337 challenges” (COP/PM/009 Ministry of Education, County government).

Challenges in addressing all components of the NCF

The analysis of the qualitative coding displayed in Table 5 reconfirms the overall finding of the review of policies and CIDPs that, while areas of health, nutrition and safety and security have been considered in policies and county level plans (coefficients >0.5, shown in green in Table 5), the domains

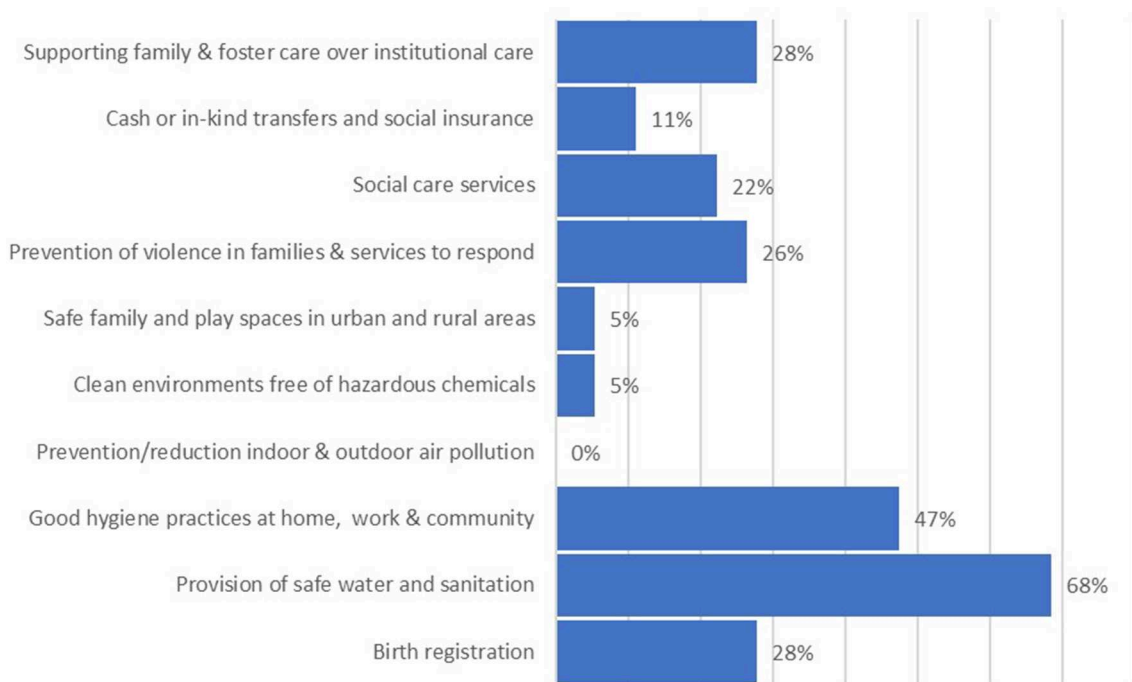


FIGURE 10
Coverage of "Safety and Security" within national policies.

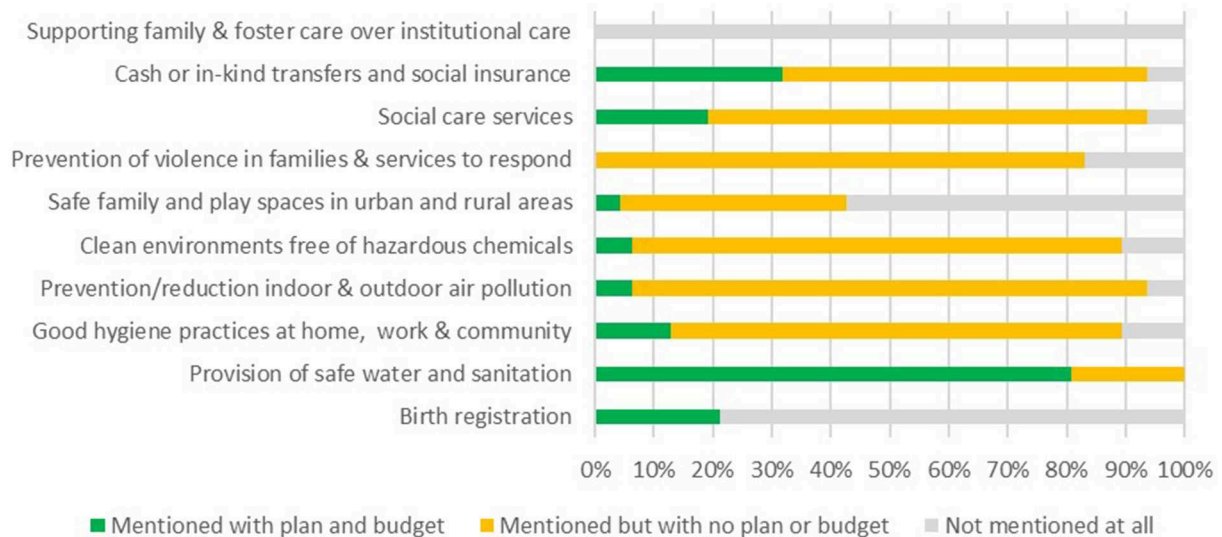


FIGURE 11
Coverage of "Safety and Security" within county integrated development plans.

of early learning and responsive caregiving face significant policy and implementation gaps including future policy plans (coefficients ≤ 0.5).

Budget allocations, particularly within the devolved structures, were identified as one reason behind the limited

focus on ECD beyond health and nutrition. There was also a concern of limited clarity on which level of government should fund implementation, with concerns from the national level that despite counties having devolved budgets, activities were left to the national level:

“Now the only problem is who should carry that burden! You see, like now we are carrying it. The National government may not have allocated funds and money for the National ECD office. It is saying those are devolved functions.” (COP/PM/005 Ministry of Education, National).

Discussion

To our knowledge, this review is the first to systematically scrutinize health and education national policies and all 47 CIDPs in Kenya to assess coverage of the NCF. The review, coupled with the qualitative findings highlight the priority given to nutrition, water, sanitation and hygiene and the limited coverage, particularly in terms of budget, given to the domains of responsive caregiving and Opportunities for early learning domains. This reflects the historical focus on child health in both policy, practice and research, but it is disappointing given the initial progress in Kenya with the integrated ECD Policy Framework of 2006. However, this does reflect the global situation across many LMICs where ECD and education are still an emerging area of government responsibility and scholarship (104). In part, this reflects donor priorities with only 0.5% in 2017, down from 0.8% in 2015, of donor education funding directed to early childhood education (105). Thus, this lack of priority to ECDE is not limited to Kenya but a global phenomenon driven in part by limited funding. Also, most of the national policies that predated the CIDPS did not seem to have a wider coverage on the components of the NCF however, current national policies for example the National Pre-Primary Education Policy Standard Guidelines 2018 and the Kenya Community Health Policy (53, 54), have demonstrated wider coverage for the components of the NCF. This is a positive development for Kenyans, who can look forward to future national policies improving and becoming better at addressing all the components of the NCF.

Our findings, particularly from the qualitative interviews highlight that the complexities of addressing this multi-sectoral challenge require more than funding alone. The challenge of working across sectors in an integrated fashion was a consistent view across our respondents. Yet the need for this multi-sectoral action to address ECD is frequently emphasized (4, 31). The Kenyan example underscores the need to not only consider multisectoral and integrated policy frameworks but also improve coordination and clarity across levels of governance, particularly national and county governments. While the context of devolution presents many opportunities for better integration across sectors within local governments, until there is greater clarity on where budgets and responsibilities should sit, little progress can be made. Despite this, there have been achievements with the establishment and expansion of ECDE centers in many counties. Based on national survey data, UNICEF estimates that 46% of children now participate in

organized learning defined as 1 year before the official primary entry age and this is similar to neighboring countries (e.g., Tanzania 56%, Ethiopia 43%, Uganda 34%). However, the rapid growth of private ECDE centers has led to concerns about quality, particularly when the trained workforce and facilities for appropriate provision are consistently lacking (106).

Consideration of responsive care and early learning for children below 4 years of age is a clear gap within national policy and county plans in Kenya. The lack of policy and plans for this age group undermines services and support for nurturing care both within the home and out-of-home interventions such as childcare centers. This is acknowledged as a global policy and practice gap and means that services for the youngest children are often uncoordinated across a plurality of public, private and informal providers with varying quality and inequitable access (107). Where Acts and policies do exist for all children in the early years (e.g., Nairobi Childcare Act 2017) (108), translating these into achievable plans, with budget allocations, is vital. Given the rapidly changing context of families due to urbanization and growing participation of women in the labor force, there is a need to ensure Acts and policies reflect the realities of childcare centers, including those in the informal sector and those that cater for children under 4 years as this review also shows a lack of policies to support early learning at home of children under 4 years. The plurality of childcare providers with the urban context increases the complexity of this task which falls to county governments and requires consideration to regulation, registration, support and monitoring of childcare centers.

Another consistent gap was the limited attention given to the role of fathers within policy and plans. This is despite evidence from national surveys across 38 LMICs identifying a significant relationship between fathers' interaction with their 3 and 4 year olds and their ECDI scores (109). Traditional gendered norms of the roles of mother and fathers continue to influence policy, plans and service provision. These norms help to explain both the lack of emphasis on the role of fathers in caring for their under five children and the lack of provision of quality center-based care to allow women seek opportunities beyond childcare. The World Values Survey asks the question: “when a woman works for pay, children suffer” in 57 countries across the income spectrum. They found that almost half (46%) of those asked agreed with the statement, with nearly as many women as men holding this view and mothers more likely to hold this view than women without children (15).

Limitations

Although we made efforts to retrieve all relevant documents, county level laws and acts were not available. Furthermore, the qualitative interviews with policy makers only covered Nairobi County and without the remaining 46 counties in Kenya, hence

views expressed by the Nairobi County policy makers may not be representative of other counties. As the qualitative interviews were only conducted with officials from health and education departments, the presented perspectives lack the views of those from other departments which deal with children's issues such as social protection.

Recommendations for policy, practice and research

1. Given the rapidly changing context of families including growing participation of women in the labor force, there is a need to ensure Acts and policies reflect the realities of childcare, as well as those in the informal sector.
2. A thorough review of the Labor Laws of Kenya to understand the extent to which they provide a family-friendly environment for parents, particularly working mothers, through the provision of childcare facilities, maternity and parental leave would be a valuable addition to this research.
3. As much childcare happens in the home in rural areas, good support for this is needed especially in relation to responsive caregiving and support for early learning that can build on existing strengths in the community health strategy.
4. Policies specifying minimum standards and plans which provide support for improvements across all domains of the NCF are needed including family-friendly policies in the workplace and affordable childcare services.
5. Understanding the values and strengths of the local context and community participation is key to feasibility, effectiveness and sustainability of strategies that address ECD.
6. There is also the need to identify responsible department(s) in relation to childcare services and to conduct further research that will help countries to develop appropriate models of care that are feasible for implementation at scale, build capacities for implementation, and obtain context-specific cost data. This data will also support identification of innovative solutions to increase access, quality, and coverage of services.
7. Given the time and resources available for this review, we were unable to analyse budget allocations to the elements of the NCF at national or county levels. Extending this analysis to also cover the extent to which county governments meet the targets set out in their monitoring and evaluation plans would allow a thorough review of progress toward implementation of the NCF.

Conclusion

This research aimed to establish the extent to which Kenyan government policies address the components of the NCF and to explore policy/decision makers' views on policy

gaps and emerging issues. Findings indicate a strong focus on nutrition, water, sanitation and hygiene with clearer policies for children aged 4–5 years and gaps in the provision for children under 3 years in both national policies and county integrated development plans. Furthermore, limited coverage of responsive caregiving and opportunities for early learning domains were found in the CIDPs particularly with a lack of budgeting and plans to involve fathers within early years care. The NCF provides a roadmap for action to address wide range of stakeholders and sectors, conveying key roles involved in giving children the best start in life. Therefore, if nurturing care goals are to be achieved in Kenya, policies are needed to support current gaps identified with urgent need for policies of minimum standards that provide support for improvements across all Nurturing Care Framework domains. Although some Counties within Kenya are ahead of others, this offers opportunities for cross learnings between Counties with inputs required from a range of sectors through policies, services, infrastructure, and information to improve the holistic development of children. Furthermore, early integration of nurturing care relevant content is needed, complemented by in-service training and continuing education of existing workforce. Nurturing care is so embedded within the lives of each family and child thus, communities can play a major role in creating enabling environments that benefit both caregivers and children.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author/s.

Ethics statement

The studies involving human participants were reviewed and approved by Health Sciences Research Governance Committee, University of York and Amref Research, and Ethics and Scientific Review Committee. The patients/participants provided their written informed consent to participate in this study.

Author contributions

HE, MA-O, MN, GO, EH, RH, and PG developed the protocol and concept of the review. MA-O, PK-W, KO, IC, MW, RM, LO, EH, MM, EM, and HE screened and extracted data from the included policy documents. MA-O and HE synthesized the policy data findings, conducted the overall synthesis of results, and drafting of the manuscript with input from MN,

GO, PA, LO, RH, and PG. All authors read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.1016156/full#supplementary-material>

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Correlates of dietary diversity among children aged 6–23 months of head porters in Ghana

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Objective: In many developing countries, most children cannot meet minimum dietary diversity (MDD), defined as the consumption of four or more of the seven food groups. In Ghana, only 35% of children met MDD nationwide in 2017, but rates are worse among the rural poor and resource-constrained individuals like Head Porters (HPs). The current study investigated the correlates of MDD in children of HPs aged 6–23 months old in Ghana.

Methods and materials: A cross-sectional survey was carried out in 2021 among 423 HPs selected purposively from eight market centers in two commercial cities. A multi-stage sampling method was used in obtaining the sample, while a structured interview guide was used to collect data from the caregivers. Stata version 15.1 and descriptive and inferential statistics like frequency, percentage, chi-square and logistic regression were used to analyze the data. All results were deemed significant if the *p*-value was <0.05 and the odds ratios with a 95% confidence interval.

Results: The children had a mean age of 14.3 (±4.9) months, while half of the caregivers (48.2%) were between 15 and 25 years. Approximately 59% (251) had good knowledge of infant and young child feeding practices (IYCF). About 45% of the children consumed a diversified diet. The number of postnatal care (PNC) visits, delivery in a health facility, meeting minimum meal frequency (MMF), and the child's age was independently associated with MDD at the multivariate level.

Conclusion: Over a third of the caregivers had poor knowledge of IYCF practices. Furthermore, less than half of the children achieved MDD reflecting the need for more education by the stakeholders. Regular PNC visits and delivery in health facilities were independently associated with MDD; therefore, interventions to combat low MDD should prioritize the relevance of these predictors.

KEYWORDS

minimum dietary diversity, knowledge, caregivers, head porters, children

Introduction

According to the 2020 World Health Report, 45.4 million and 149.2 million under-five children were wasted and stunted, respectively. Most of these fatalities are reported in Africa and Southern Asia (1). Again, the World Health Organization (WHO), United Nations International Children's Education Fund (UNICEF), and World Bank estimates of child malnutrition from 2020 showed that over 5 and 30% of African children under 5 years were wasted and stunted (2). The Sustainable Development Goal (SDG) 2 seeks to eliminate all forms of malnutrition and achieve the 2025 global targets on stunting and wasting. Malnutrition has a significant negative impact on the factors that determine a child's quality of life, including physical and intellectual development, school performance, and potential future earnings and productivity (3, 4).

Ghana has made slow but consistent progress in lowering child undernourishment over the past 10 years. The Multiple Indicator Cluster Surveys (MICS) (2017) reported that 20 and 10% of children under 5 years are stunted and underweight, respectively. Again, the latest national dataset conducted in 2014, Ghana Demographic Health Survey (DHS), documented that in 2014, the percentage of stunting, wasting, and underweight was 19, 5, and 11%, respectively (5). This trend seems promising compared to the malnutrition rates in other African nations. However, these estimations are still deemed high by the WHO (2) and necessitate further research into the root causes of malnutrition in Ghana.

In addition to repeated infections and infectious diseases, inappropriate breastfeeding and suboptimal complementary feeding practices (SCFP) are significant determinants of malnutrition and poor health in Ghana and globally among < 5-year-old children (6–8). According to UNICEF, there is a strong relationship between dietary quality (DQ) and child malnutrition. Dietary diversity (DD) is a valuable indication of children's nutritional status (NS), DQ, and nutrient adequacy (9). It is the number of food types ingested throughout a given time. Minimum dietary diversity (MDD), which measures the percentage of children 6–23 months of age who consumed ≥ 4 food groups the day before, is a critical pointer when dealing with IYCF (10, 11). Nonetheless, meeting the MDD requirement is problematic in many low-income nations because there is evidence from various DHSs undertaken in 33 African countries that only 25% of children could meet the threshold (12, 13). For instance, Burkina Faso and Niger had the worst national MDD rate of 5.6% in 2010 and 8% in 2012, respectively. Also, the MDD prevalence was 19% for Chad in 2015 and DR Congo in 2014, 13% for Ethiopia in 2016, and 22% for Liberia in 2020. Only South Africa had a 50% national prevalence of MDD in the year 2016 (12–14). This phenomenon is attributed to the fact

that the diets of most poor households are monotonous since the mainstay is starchy staples like gruel and porridges, which contain few or no animal products, as well as vegetables and legumes (12).

In 2014, ~38% of Ghana's population dwelt in slums or streets, primarily concentrated in commercial cities (15). Among these slums and street-dwellers are uneducated young women who migrate to the cities in the south from the rural north of Ghana due to the high rate of food insecurity, malnutrition, and poverty in the northern regions to work in the informal economic sector as HPs known locally as *kayaye* (15). Therefore, the Ghana Statistical Service (GSS) reported in 2012 that among migrant HPs in Ghana, more than 56% are young school-age girls and women (16).

These girls carry goods on their heads to earn an income due to the lack of convenient transportation in the central business centers between bus terminals and sales points (17). Due to the high sexual activities among these girls, some give birth and stay with their children (17, 18). Children born to such women lack the physical, social and psychological environment needed for proper growth and development and therefore become malnourished (18). Additionally, the dynamic nature of the work stresses the mothers; therefore, breastfeeding rates and child feeding practices are reported to be very low among women in slums, affecting their children's physical growth and development (19). As a result, infant mortality and malnutrition are higher among slum dwellers than in non-slum areas and even rural areas due to the deplorable living conditions of its inhabitants, exposing them to the spread of diseases, poor health, and malnutrition (20).

Studies among HPs previously include Cudjoe and Alhassan, which assessed the social support system of HPs in Kumasi (18), while another study (21) evaluated the utilization of health insurance among female HPs in Kumasi. Also, a study (24) investigated health care inequities affecting female migrants in Ghana, whereas (20) reported cultural and socio-economic difficulties facing female porters in Agbogboshie, Accra. Clearly, these studies were carried out in small areas and focused mainly on the cultural and socio-economic difficulties (17, 18) and health and living conditions (20). To better understand what is provided and the quality of the food served, we used the UNICEF conceptual framework to assess the multilevel factors that impact the consumption of a diversified diet in children. This study posits that different factors at the individual, maternal, household, environmental and social services relate to enable children achieve MDD (22). Such data will guide policy and help create targeted activities to address the particular issues faced by HPs. To date, no study has been undertaken to ascertain the DD of meals given to UFC of HPs in Ghana. This study, therefore, sought to investigate the correlates of DD among 6–23 months old children of HPs in Ghana.

Methodology

Study location

The research was undertaken in Accra and Kumasi, two commercial centers in Ghana, West Africa. According to the 2021 census, Accra is the country's most populated metropolis, with a population of 2.27 million and a land area of 225.67 square kilometers. The city serves as Ghana's economic and administrative center (17, 22). With a population of 1.77 million people and a density of 254 km², Kumasi, Ghana's largest city (after Accra), is a prominent commercial and administrative center, particularly in Ghana's northern and central zones. In Ghana and the sub-region, these two towns are the main business destinations, and their strategic locations also make them a competitive position for HPS. Previous studies (20, 21) documented the following markets Tudu, Agbobbloshei, Mallam Atta, Tema station and, Cocoa Marketing Board in Accra and Adum, Kronum, Race Course, Aboabo, Bantama, and Suame in Kumasi as the markets that HPs operate most in these commercial cities (20).

Sample size determination

Using the Cochran formula, the study sample was determined to obtain 500 respondents based on the formula $N = \frac{Z^2 pq}{e^2}$, where N is the desired sample size, Z is the selected critical value of desired confidence level, p is the estimated prevalence of 0.35, q = 1-p, e is the desired level of precision fixed at 5 and 10% estimated non-response rate.

Sampling procedure

The multistage sampling method was employed. In the first stage, two commercial cities, Accra and Kumasi, were selected to form the primary selection unit. Further, to obtain the secondary selection unit, eight marketplaces documented to have intense head porter activities were chosen using the purposive sampling technique (18). Racecourse, Suame, Bantama, and Kronum were selected from Kumasi, while Agbobbloshei, Tudu, Madina, and Tema Station were chosen in Accra. The final stage involved the selection of the various respondents from the various market centers. At this stage, the snowball approach was employed to select eight leaders from each market cluster to determine the population of HPs and a list of those with infants under the age of 2 years in the designated areas, which served as the study's sample frame. The snowball sampling technique is appropriate because previous studies (19, 23, 25) found that HPs lived in groups with a leader and that they have a solid social network, making them reluctant to interact with strangers whom they suspect unless through their leaders, who helped educate and

inform them about the study's utility. Furthermore, the fraction method of the systematic sampling technique was used to obtain 63 caregivers each from Agbobbloshei, Tudu, Racecourse, and Tema station due to high numbers of HPs present and 62 from the remaining eight market clusters, resulting in a total sample size of 500 caregivers.

Data collection and statistical analysis

To collect data from the caregivers, a structured interview guide was used. The study tool was translated from the English language into the caregivers' native languages for better understanding. Two investigators independently translated the questions to avoid inconsistencies, and comparisons were made afterward. The guide, adapted from the standard DHS questionnaire, was modified to fit the context of this study. The tool assessed children's, caregivers' obstetrics and health-care characteristics, caregivers' awareness of nutritional diversity and child feeding, and caregivers' DD (26, 27).

After contacting the caregivers through their group leaders, informed consent was given verbally by those who were eligible after informing them of the purpose of the study and assuring them of anonymity. Data was collected on Sundays when the head porters were less busy because of the low economic activities. The data collection process lasted for 6 months, between April and October in 2021. Three trained research assistants facilitated the data collection procedure. Stata 15.1 was used and further entered into a Microsoft Excel database to clean and analyze the data. Means and standard deviations were reported for continuous variables, while frequencies with percentages were computed for categorical variables. Pearson's chi-square test of independence was conducted to determine a bivariate statistically significant association between MDD and explanatory variables. Variables found to be statistically significant during the bivariate analysis were included in a multivariate logistic regression model to identify the predictors of the outcome variables. All tests performed were considered statistically significant at $p < 0.05$ at a 95% Confidence Interval.

MDD determination

Based on the WHO's recommendations, 6–23-month-old children who had four or more foods from the seven standard food groups the day before the study were regarded to have a minimum acceptable DD. The DD score was computed by summing the food categories the child ate the day before the interview. These seven food groups were roots, tubers, and grains; legumes and nuts; all dairy (milk, yogurt, cheese); flesh foods (meat, fish, poultry, and liver/organ meats); eggs; vitamin-A rich fruits and vegetables; other fruits and vegetables (28–30).

The maternal DD was based on the Food and Agriculture Organization's (FAO) Minimum Dietary Diversity for Women (MDD-W), a global pointer of DD among women between 15 and 49-years-old. Ten food groups were summed up to generate the MDD-W score: starchy staples, nuts and seeds, eggs, pulses, flesh foods, dairy foods, leafy green vegetables, other vegetables, other fruits and vegetables rich in vitamin A, and other fruits. Caregivers who consumed foods from \geq five food groups were considered to have met the MDD-W (31).

Assessment of nutrition knowledge

Caregivers' knowledge was assessed using a 13-point scale adapted from FAO's Guidelines for assessing nutrition-related Knowledge, Attitudes, and Practices (KAP) manual (32, 33). The categories for knowledge scores were good (≥ 7) and poor (0–6). The item consisted of questions that solicited the caregiver's nutritional knowledge. A correct response to each question was awarded a score of 1, otherwise 0. The maximum attainable score was 13. A composite knowledge score was calculated for each caregiver, and a median score was determined. Caregivers below the median score (7-points) were considered to have inadequate or poor nutritional knowledge. In contrast, those who scored the median and above (≥ 7) were classified as having adequate dietary understanding (34).

Wealth index determination

This was determined using household assets (TV, refrigerator, truck, bicycle, radio, and telephone), housing quality (floor, roofing materials, walls), and water and sanitation facilities. A summation of these gave the proxy WI of each family after creating dummy variables from these and forming terciles. The categorization was poor, middle, and high (34).

Results

The demographic profile of the study respondents has been presented in Table 1. A total of 423 dyads participated in the study out of the estimated sample of 500, yielding a response rate of approximately 85%. About 48% of the caregivers were between 15 and 25 years of age, while almost 40% had 5–9 members in a household. Nearly 62% of the caregivers had no formal education, and over 83% were married. Muslims constituted about 85% of the total sample. It was revealed that about 50% of the respondents earned 10–20 cedis daily wage, an equivalent of \$2.5. Mamprusi formed a predominant part of the respondents comprising almost two-thirds (61.5%) of the total sample.

TABLE 1 Demographic and household characteristics of caregivers and children.

Characteristics	Frequency N = 427	Percent (%)
Demographic characteristics		
City of study		
Accra	213	50.4
Kumasi	210	49.6
Mean \pm SD age of caregiver	25.7 \pm 5.9	
Caregivers' age, in years		
15–24	185	48.1
25–34	160	41.8
35–50	39	10.6
Marital status		
Single	44	10.4
Married/living together	363	85.8
Divorced/separated	10	2.4
Widowed	6	1.4
Highest educational level		
No education	260	61.5
Primary	138	32.6
Secondary	25	5.9
Ethnicity		
Dagomba	58	13.7
Kusasi	12	2.8
Mamprusi	259	61.5
Sesala	36	8.5
Tampauri	8	4.3
Others	40	9.5
Religion		
Christianity	57	13.5
Islam	364	86.1
African traditional religion	2	0.4
No. of years as head porter		
0–6 mths	147	34.8
7–11 mths	32	7.6
1–2 yrs	60	14.2
>2 yrs	184	43.5
Daily earning (GHC)		
<10	30	7.1
20–30	204	48.2
31–40	142	33.6
>40	47	11.1
Type of family		
Single parent	42	9.9
Nuclear	147	34.8
Extended	234	55.7
	Frequency N = 423	Percent (%)
Household size		
1–4	105	24.8
5–9	166	39.3
10+	152	35.9
Kiosk	133	31.4
Wealth index		
Poorest	117	27.7

(Continued)

TABLE 1 (Continued)

Characteristics	Frequency N = 427	Percent (%)
Poorer	258	61.2
Richest	47	11.1
Maternal characteristics		
No. of children		
1–2	213	50.4
3–4	147	34.7
5+	63	14.9
No. of ANC visits		
<4 visits	61	15.3
4+ visits	338	84.7
Place of delivery		
Healthcare facility	306	72.3
Others	117	27.7
Mode of delivery		
Vaginal delivery	404	95.5
Cesarean section	19	4.5
No. PNC visits		
<4 visits	101	24.7
4+ visits	308	75.3
Child characteristics		
Mean child age (in months) \pm SD	16.0 \pm 7.7 SD	
Child's age, in months		
6–11	142	33.6
12–23	281	66.4
Sex of child		
Male	209	49.4
Female	214	50.6
Birth order of child		
First	100	23.6
Second	135	31.9
Third and above	188	44.5
Child received BCG immunization		
No	77	18.2
Yes	346	81.8
Child received Penta 1 and OPV 1		
No	88	18.2
Yes	346	81.8
Child received Penta 2 and OPV 2		
No	101	23.9
Yes	322	76.1
Child received Penta 3 and OPV 3		
No	123	29.1
Yes	300	70.9
Child received measles immunization		
No	189	44.7
Yes	234	55.3

1 Ghana cedi = ~0.75 USD as at August, 2022.

TABLE 2 Maternal knowledge of IYCF.

Knowledge variables	Frequency (%)
The first food for a newborn is breast milk only	376 (88.9)
Breastfeeding should be initiated within 1 h after birth	238 (56.3)
A child under 6 months old should be breastfed on demand	383 (90.5)
Expressed Breast milk should be fed to a child in the absence of the mother	20 (4.7)
Cessation of breastfeeding is at 2 years	226 (53.4)
A child should be breastfed on-demand after weaning	296 (70)
A child could be weaned at 6 months of age	249 (58.9)
A child between 6 and 8 months old should be fed at least twice a day	375 (88.7)
A child between 9 and 23 months old should be fed three or more times a day	336 (79.4)
There are 6 Ghanaian food groups a child's meal should be planned with	21 (5.0)
Awareness of signs of Iron-Deficiency Anemia	42 (9.9)
Awareness of causes of Anemia	81 (19.1)
The best way to feed complementary foods is by using a cup/plate and spoon	217 (51.3)
Overall knowledge of IYCF	172 (40.7)
Poor	
Good	251 (59.3)

About 50% had 1–2 children, while 99% were the children's mothers. Over 70% of the children were delivered at a healthcare facility, while about a quarter was born at home. The antenatal (ANC) and PNC visit rates were 94 and 97%, respectively, among the caregivers. The mean age of the children was 14.3 (± 4.9) months. Regarding sex distribution, the females (50.2%) were a little more than the males (49.8%).

Caregivers' knowledge in IYCF practices

Results of Caregivers' knowledge of IYCFP are presented in Table 2 below.

Among the 423 caregivers, 52% (217) got more than seven out of the thirteen questions correctly, having a good knowledge of IYCF. In contrast, 48% (199) had poor knowledge of IYCF practices because they could not respond correctly to more than seven. The caregivers' nutritional knowledge mean score was 5.5 (± 1.4) out of 13. Furthermore, 370 (91%) and 357 (87.1%) were knowledgeable about the first food for an infant and the best time

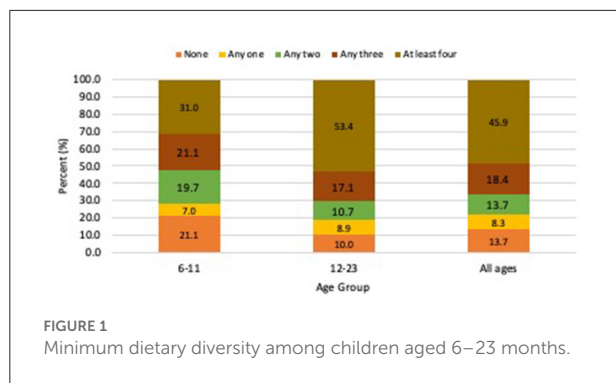


TABLE 3 Food groups consumed the preceding 24-h by children 6–23 months.

Item	Yes (%)	No (%)
Roots, tubers and grains	336 (79.4)	87 (20.6)
All dairy ^a	248 (58.6)	175 (41.4)
Vitamin A-rich fruits and vegetables ^b	242 (57.2)	181 (42.8)
Flesh foods ^c	193 (45.6)	230 (54.4)
Eggs	165 (39.1)	258 (60.9)
Legumes and nuts	121 (28.6)	302 (71.4)
Other fruits and vegetables	95 (22.5)	328 (77.5)

^aIncludes all dairy, yogurt, cheese, milk and other milk products.

^bIncludes all pumpkin, carrots, squash or sweet potatoes, dark green leafy vegetables, mangoes, pawpaw, and other locally grown fruits and vegetables that are rich in vitamin A.

^cIncludes all types of meat, poultry, fish, shellfish, and organ meat.

to initiate breastfeeding, respectively. As high as 84, 91, and 80% of the respondents lacked knowledge of the existence, signs, and causes of iron deficiency anemia, respectively. Knowledge about the number of food groups a child is supposed to be fed from was the least because < 5% responded correctly. Again, <5% of the caregivers knew about breastmilk expression.

Concerning sources of information for IYCF, about half (50.4%) and one-third (34.9%) of the respondents mentioned health professionals and relatives, respectively, as the primary source.

Dietary diversity of 6–23-month-old children

In Figure 1 and Table 3, minimum dietary diversity among the children and the food groups they consumed the preceding day has been ranked in and ascending order and presented, respectively.

The measure of MDD was based on a child's ability to consume four or more of the seven food groups as recommended by WHO. The results in Figure 1 revealed that more than half (54.1%) of the children could not meet the MDD since just 45.9% had consumed a diversified diet in the preceding 24-h period. Moreover, the younger the child, the less likely they were to meet the MDD because more infants aged 6–11 months (69%) were unable to meet the MDD compared to those between 12 and 24 months old (46.6%), as presented in Figure 1. Among the seven food groups, fruits and vegetables (22.5%) were the least consumed fruits and vegetables. Equally, as can be observed in Table 3, the intake of legumes and eggs was low because this was lacking in the meals of over 70 and 60% of the children, respectively. Grains and tubers were the highest consumed food group (81%), followed by milk and dairy foods (61.5%). Moreover, <40% reported consuming eggs in the past 24 h.

Association between demographic and household characteristics of caregivers and children and MDD

The association between demographic and household characteristics of the caregivers and their children and MDD has been presented in Table 4.

A Pearson's chi-square of independence test was performed at a statistically significant threshold of $\alpha = 0.05$ to determine factors associated with MDD (Table 4). The test found a statistically significant difference between caregivers' ethnicity, the number of years as a head porter (HP), maternal DD, place of baby delivery, PNC visits, child meeting MME, child's age, BCG, Penta1, Penta 2, Penta 3, and measles immunization.

Determinants of MDD among children 6–23 months

The independent variables that were statistically significant in the bivariate analysis were modeled into the multivariate regression to estimate the determinants of MDD among children aged 6–23 months. The findings are reported in Table 5.

The number of years as a head porter (HP), the place of baby delivery, the number of PNC visits, meeting MME, and the child's age all had a statistically significant relationship with MDD. Compared to individuals who had been HPs for <7 months, those who were HPs for 7–11 months were 64% (AOR = 0.36; 95% CI: 0.15; 0.96, $p = 0.046$) less likely to meet the MDD. Compared to caregivers who delivered elsewhere, those who delivered in a health institution were more than twice as likely to meet the MDD. Again, caregivers who made more than four (≥ 4 visits) PNC visits were 1.8 (AOR = 1.82; 95%

TABLE 4 Association between maternal and child characteristics and MDD among children 6–23 months.

Items	MDD			Chi-square	p-value
	No (%)	Yes (%)	No (%)		
Demographic characteristics					
City					
Accra	213 (50.4)	103 (50.1)	110 (48.0)	1.070	0.300
Kumasi	210 (49.6)	91 (46.9)	119 (52.0)		
Caregivers' age, in years					
15–24	185(48.2)	83 (46.6)	102 (49.5)	0.56	0.754
25–34	160 (41.7)	75 (42.1)	85(41.3)		
35–50	39 (10.6)	20 (11.2)	19 (9.2)		
Marital status				3.46	0.326
Single	44 (10.4)	16 (8.3)	28(12.2)		
Married/living together	363 (85.8)	173(89.8)	190 (83)		
Divorced/separated	10 (2.4)	3 (1.6)	7 (3.1)		
Widowed	6 (1.4)	2 (1.0)	4 (1.8)		
Highest educational level				1.87	0.393
No Education	260 (61.5)	126 (65.0)	134 (58.5)		
Primary	138 (32.6)	58 (29.9)	80 (34.9)		
Secondary	25 (5.9)	10 (5.1)	15 (6.6)		
Ethnicity					
Dagomba	58 (13.7)	20 (10.3)	38 (16.6)	23.08	0.0003
Kusasi	12 (2.8)	5 (2.6)	7 (3.1)		
Mamprusi	259 (61.2)	139 (71.7)	120 (52.4)		
Sesala	36 (8.5)	6 (3.1)	30 (13.1)		
Tampauri	18 (4.3)	9(4.64)	9 (4.64)		
Others	40 (9.5)	15 (7.7)	25 (10.9)		
Religion					
Christianity	57 (13.48)	26 (13.4)	31 (13.5)	1.71	0.426
Islam	364 (86.1)	168 (86.6)	196 (85.6)		
African traditional religion	2 (0.47)	0 (0.00)	2 (0.9)		
No. of years as head porter				12.34	0.00063
0–6 mths	147 (34.8)	58 (29.9)	89 (38.7)		
7–11 mths	32 (7.6)	8 (4.12)	24 (10.5)		
1–2 yrs	60 (14.2)	32 (16.5)	28 (12.2)		
>2 yrs	184 (43.5)	88 (38.4)	96 (49.5)		
Average amount of money made daily					
<10	30 (7.1)	11 (5.7)	19 (8.3)	2.26	0.521
10–20	204 (48.2)	92 (47.4)	112 (48.9)		
30–40	142 (33.6)	71 (36.6)	71 (31.6)		
>40	47 (11.1)	20 (10.3)	27 (11.8)		
Type of family				4.62	0.099
Single Parent	42 (9.9)	13 (6.7)	29 (12.7)		
Nuclear	147 (34.8)	73 (37.6)	74 (32.3)		
Extended	234 (55.3)	108 (55.7)	126 (55.0)		

(Continued)

TABLE 4 (Continued)

Items	MDD			Chi-square	p-value
	No (%)	Yes (%)	No (%)		
Household size				1.03	0.598
1–4	105 (24.8)	44 (22.7)	61 (26.6)		
5–9	166 (39.2)	80 (41.2)	86 (37.6)		
10+	152 (35.9)	70 (36.1)	82 (35.8)		
Wealth index				2.09	0.352
Poorest	117 (27.7)	59 (30.4)	58 (25.4)		
Poorer	258 (61.1)	117 (60.3)	141 (61.8)		
Richest	47 (11.4)	18 (9.3)	29 (12.7)		
Maternal characteristics					
Knowledge of IYCF				0.86	0.031
Good	251 (56.3)	116 (59.8)	135 (58.9)		
Poor	172 (40.7)	78 (40.2)	94 (41.1)		
No. children				1.47	0.4805
1–2	213 (50.35)	92 (47.4)	121 (52.8)		
3–4	147 (34.8)	73 (37.6)	74 (32.3)		
5+	63 (14.9)	29 (15.0)	34 (14)		
Aunt	3 (0.71)	1 (0.52)	2 (0.87)		
Met maternal dietary diversity				5.477	0.019*
No	174 (41.1)	68 (35.1)	106 (46.3)		
Yes	249 (58.9)	126 (64.9)	123 (53.7)		
No. ANC visits				2.05	0.1522
<4 visits	61 (15.3)	23 (12.5)	38 (17.7)		
4+ visits	338 (84.7)	161 (87.5)	177 (82.3)		
Place of delivery				8.47	0.0036*
Healthcare facility	306 (72.3)	127 (65.5)	179 (78.2)		
Others	117 (27.66)	67 (34.5)	50 (21.8)		
Mode of delivery					
Vaginal delivery	404(95.5)	187 (96.4)	217 (94.8)	0.65	0.419
Cesarean section	19 (4.5)	7 (3.61)	12 (5.24)		
No. PNC Visits					
<4 visits	101(24.7)	36 (19.2)	65 (29.4)	5.75	0.0165*
4+ visits	308(75.3)	152 (80.9)	156 (70.6)		
Child characteristics					
Child met MMF					
No	229 (54.1)	111 (39.5)	72.21	0.000*	
Yes	194 (45.9)	170 (60.5)			
Child's age, in months					
6–11	142 (33.6)	44 (22.7)	19.05	0.000*	
12–23	281 (66.4)	150 (77.3)			
Sex of child					
Male	209 (49.4)	94 (48.5)	0.13	0.718	
Female	214 (50.6)	100 (51.6)			
Birth order					
First	100 (23.6)	46 (23.7)	0.04	0.980	
Second	135 (31.9)	61 (31.4)			
Third and above	188 (44.4)	87 (44.9)			

(Continued)

TABLE 4 (Continued)

Items	MDD			Chi-square	p-value
	No (%)	Yes (%)	No (%)		
Child received BCG immunization					
No	77 (18.2)	24 (12.4)	8.19	0.0042*	
Yes	346 (81.8)	170 (87.6)			
Child received Penta 1 and OPV 1					
No	88 (20.8)	28 (14.4)	8.83	0.003*	
Yes	335 (79.2)	166 (85.6)			
Child received Penta 2 and OPV 2					
No	101 (23.9)	36 (18.6)	5.58	0.0182*	
Yes	322 (76.1)	158 (81.4)			
Child received Penta 3 and OPV 3					
No	123 (29.1)	42 (21.7)			
Yes	300 (70.9)	152 (78.4)	9.59	0.0020*	
Child received measles					
No	189 (44.7)	75 (38.7)			
Yes	234 (55.3)	119 (61.3)	5.26	0.0219*	

*p-value less than 0.05. Bold values means p-values which are statistically significant.

CI 1.09–3.05; $p = 0.023$) times more likely to feed the MDD than caregivers who made fewer than four PNC visits. Moreover, children between 12 and 23 months and those who met the MMF had 2.4 (AOR = 1.82; 95% CI 1.09–3.05; $p = 0.023$) and 2.3 (AOR = 1.82; 95% CI 1.09–3.05; $p = 0.023$) higher odds of meeting the MDD than their younger counterparts of 6–11 months and who did not meet the MMF, respectively. However, all the remaining variables were not statistically significant at the multivariate level.

Discussions

The analysis showed that a little over half of the caregivers were between 15 and 25 years which reflects the young age of the caregivers and confirms previous studies among HPs (35, 36), in which approximately 80% of the respondents were between 15 and 24 years. Additionally, earlier studies among HPs indicated that over 80% were uneducated, a trend similar to our findings. This could be attributed to the belief that in some socio-cultural settings, females are socialized into homemaker roles. Therefore, education may not be a priority for them (36). The wages earned by the caregivers were significantly inadequate. This could affect their access to nutritious food and compromise quality food consumption and adequate quantities needed for the physiological functions of their children (36).

TABLE 5 Determinants of MDD among children 6–23 months.

MDD	Adjusted odds ratio	95% CI	p-value
Ethnicity			
Dagomba	Reference		
Kusasi	1.20	[0.28–5.03]	0.807
Mamprusi	1.36	[0.71–2.61]	0.358
Sesala	0.41	[0.14–1.22]	0.108
Tampauri	1.45	[0.46–4.64]	0.526
Others	0.768	[0.31–1.91]	0.572
No. years as a head porter			
0–6 mths	Reference		
7–11 mths	0.36	[0.15–0.96]	0.050
1–2 yrs	1.27	[0.65–2.49]	0.483
>2 yrs	1.03	[0.63–1.72]	0.881
Place of child delivery			
Others	Reference		
Healthcare facility	2.03	[1.25–3.31]	0.004
No. PNC visits			
<4 visits	Reference		
4+ visits	1.82	[1.09–3.05]	0.023
Age of child (months)			
6–11	Reference		
12–23	2.39	[1.48–3.87]	0.000
Maternal dietary diversity			
No	Reference		
Yes	1.45	[0.92–2.28]	0.102
Knowledge of IYCF			
Poor	Reference		
Good	1.02	(0.66–1.58)	0.08
Child received BCG immunization			
No	Reference		
Yes	1.22	[0.35–4.31]	0.756
Child received Penta 1 and OPV 1 immunization			
No	Reference		
Yes	1.18	[0.32–4.37]	0.800
Child received Penta 2 and OPV 2 immunization			
No	Reference		
Yes	0.40	[0.11–1.44]	0.162
Child received Penta 3 and OPV 3 immunization			
No	Reference		
Yes	0.93	[0.41–2.14]	0.868
Child received measles immunization			
No	Reference		
Yes	1.15	[0.67–1.96]	0.617

Bold values means p-values which are statistically significant.

The knowledge level of the caregivers was relatively low, given that not even one percent obtained more than 10 out of the 13 questions posed to them. Probably, the low educational

level explains this outcome because the knowledge, either subjective or objective, is a driver that influences food choice and impacts the adoption of healthy eating behavior. Again, nutrition knowledge is associated with a quality diet and could enable caregivers to obtain accurate information on what should be fed to the child and its effects on health, thereby improving food diversity. Our results confirm a study (33) conducted in a similar socioeconomic setting in Ghana. Of great concern is the poor knowledge of the caregivers on the number of food groups children should be fed from. Since over 90% did not know these food groups, one would wonder how proper planning of the child's meal will be done to achieve a diversified meal. This result suggests that the Ghana Health Service (GHS) and other stakeholders should intensify nutrition education at ANC and PNC. Moreover, knowledge of the causes and signs of Iron Deficiency Anemia (IDA) was shallow. In Ghana, over 70% of under-5-year-olds are anemic (4); hence the provision of knowledge at health facilities, radios, and religious facilities may improve the knowledge base of these caregivers.

The results revealed that the prevalence of MDD was 45.9%, and this rate is slightly lower than the 47% rate reported in the Ghana Multiple Indicator Cluster Survey (MICS4) (37) but higher than the GDHS rate of 27% (38). Differences in study design, timing, and environment could account for the disparity. Moreover, it was discovered that MDD increased with age, which is comparable to earlier studies (36, 38) in Ghana and elsewhere in Ethiopia (30) and Uganda (42). This finding implies that these younger children may be unable to meet their nutrient needs. Therefore, more attention should be given to the younger children who are beginning the weaning process by caregivers since they are more vulnerable.

The food group, fruits and vegetables, was least consumed. This could be because of the cost, which may be the high cost which is unaffordable for individuals from poor households in Ghana, or caregivers' lack of knowledge on how to incorporate them into meals and hence the need for education. Studies in Ethiopia (30, 39), Ghana (40, 41), and a comparative study in Vietnam, Bangladesh, and Ethiopia (43) all found a similar pattern. The low intake of legumes and eggs is problematic, considering the unique roles they play in the development and growth of a child. The low consumption could be attributed to some myths and beliefs associated with the intake of protein foods like eggs among some ethnic groups, as reported in studies undertaken in Ghana, Nigeria, and Ethiopia (44–47). Importantly, these are relatively cheaper protein sources for a disadvantaged group like the HPs. Our results call for more education by stakeholders on the usefulness of affordable but nutritious foods among low-income groups during ANC and PNC visits.

The number of PNC visits, an underlying determinant of the model used for this study was a predictor of MDD. This finding is consistent with previous studies (30, 44, 46). All these studies revealed that caregivers who attended PNC visits were much

more likely to achieve MDD than their counterparts who did not. The positive association could mean that these caregivers practice education obtained during PNC visits.

Baby delivery in a health facility was positively associated with providing a diversified diet. This result corroborates with studies in Ethiopia and South Asia (48, 49) and could be explained by the fact that caregivers are well educated during ANC visits by health personnel on the need to feed a diversified diet. Children that met the MMF were far more likely to meet the MDD, which aligns with previous reports (30, 50). This is expected since meeting MMF meant eating the recommended number of times, which could include a more diversified diet.

A limitation of this analysis is the cross-sectional nature, so the data cannot establish causal relationships. Also, self-reports of the caregivers could be a source of recall bias. The children's dietary intakes were determined with a 24-h recall, but this may not be a true reflection of their nutritional habits and intakes.

Conclusion

More than a third of the caregivers had poor knowledge of IYCF practices. Furthermore, less than half of the children achieved MDD reflecting the need for more education by the stakeholders. The study confirmed regular PNC visits and delivery in health facilities as independently associated with MDD; therefore, interventions to combat low MDD should prioritize the relevance of these predictors in order to alleviate morbidity, mortality, and under-nutrition in this population which can enable Ghana to achieve its national nutritional targets. Stakeholders like the GHS should develop innovative ways to reach out to these caregivers given their busy daily schedules. This could include organizing ANC and PNC roadshows for the mothers on Sundays and holidays in order to encourage them to participate.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the Institutional Review Board (IRB) of the School of Public Health, Zhengzhou University (ZZUIRB 2020-58). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

Author contributions

AA and QL developed the study framework, performed data analysis, and drafted the paper. The data analysis inputs were provided by AD and LW with support from TS, ED, and BY. All authors reviewed and contributed to subsequent drafts and approved the final version for publication.

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Co-creation and self-evaluation: An accountability mechanism process in water, sanitation and hygiene services delivery in childcare centres in Nairobi's informal settlements

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Background: Accountability strategies are expected to enhance access to water, sanitation and hygiene (WASH) service delivery in low-and middle-income countries (LMIC). Conventional formal social accountability mechanisms (SAMs) for WASH service delivery have been inadequate to meet the needs of residents in informal settlements in LMICs. This has prompted growing interest in alternative informal SAMs (iSAMs) in Nairobi's informal settlements. To date, iSAMs have shown a limited effect, often due to implementation failures and poor contextual fit. In childcare centers in Nairobi's informal settlements, co-creation of the iSAMs process, where parents, childcare managers, researchers and other WASH stakeholders, contribute to the design and implementation of iSAMs, is an approach with the potential to meet urgent WASH needs. However, to our knowledge, no study has documented (1) co-creating iSAMs processes for WASH service delivery in childcare centers and (2) self-evaluation of the co-creation process in the informal settlements.

Methods: We used a qualitative approach where we collected data through workshops and focus group discussions to document and inform (a) co-creation processes of SAMs for WASH service delivery in childcare centers and (b) self-evaluation of the co-creation process. We used a framework approach for data analysis informed by Coleman's framework.

Results: Study participants co-created an iSAM process that entailed: definition; action and sharing information; judging and assessing; and learning and adapting iSAMs. The four steps were considered to increase the capability to meet WASH needs in childcare centers. We also documented a self-evaluation appraisal of the iSAM process. Study participants described that the co-creation process could improve understanding, inclusion, ownership and performance in WASH service delivery. Negative appraisals described included financial, structural, social and time constraints.

Conclusion: We conclude that the co-creation process could address contextual barriers which are often overlooked, as it allows understanding of issues through the ‘eyes’ of people who experience service delivery issues. Further, we conclude that sustainable and equitable WASH service delivery in childcare centers in informal settlements needs research that goes beyond raising awareness to fully engage and co-create to ensure that novel solutions are developed at an appropriate scale to meet specific needs. We recommend that actors should incorporate co-creation in identification of feasible structures for WASH service delivery in childcare centers and other contexts.

KEYWORDS

accountability, childcare centers, water sanitation and hygiene (WASH), co-creation and co-production, children, urban governance, urban health, informal settlements

Introduction

Childcare centers are common particularly in informal settlements in low and middle-income countries (LMICs), due to an increased number of working hours in rapidly expanding urban areas (1). Childcare centers have a growing significance in shaping life course trajectories for children (1, 2). A large gulf has opened up between the transformative promises offered by policy actors and the insufficient, often low quality and inequitable realities of access to water, sanitation, and hygiene (WASH) services by children under 5 years old in childcare centers in LMIC (2). Many of the basic services are neither statutory nor compulsory, with limitations of finance, governance and a growing reliance on non-governmental organization (NGO), faith-based and private-for-profit led initiatives (3, 4). As such, children under 5 years of age are among the marginalized and under-represented in access to services, including WASH service delivery in childcare centers (4, 5), more so in informal settlements (6, 7).

Access to WASH services in childcare centers is important for child health and wellbeing (8). Improved WASH practices are essential for reduced transmissions of WASH-related diseases (9, 10). Diseases such as diarrhea, parasitic worm infections, skin and eye diseases, need to be tackled by implementing guidelines that facilitate WASH service delivery in settings including childcare centers in informal settlements (3, 6). Implementation of the guidelines includes service providers

observing WASH standards and indicators (9, 11). When the service providers are responsible for appropriate WASH practices, accountability mechanisms can play a significant role in ensuring good practices are upheld (7). Social accountability is a process in which individuals are obliged to explain their actions to other individuals, who have the right to judge them and to administer positive or negative consequences in response to the actions taken (12). Improved WASH practices require social accountability to protect young children’s right to adequate WASH services guaranteed in the Convention on the Rights of the Child (13). Social accountability mechanisms (SAMs) may be one way to improve access to WASH services (12, 14). Yet, the failure of conventional formal accountability mechanisms in WASH service delivery has prompted growing interest in alternative models of informal SAMs (15, 16). Informal SAMs (iSAMs) for improving WASH service delivery have shown a limited effect (17, 18), because the iSAMs processes are usually not carried out as intended, as such the implementation fidelity is low (19, 20), due to the poor contextual fit of the processes (20–22) and a lack of readiness for change (20). To develop a more efficient and responsive process, co-creation, where childcare managers, parents and relevant actors develop the iSAM process is increasingly encouraged (21).

Co-creation refers to a collective creativity that is experienced and performed jointly by a group of people (19, 20), where end-users collaborate with service providers and other non-academic stakeholders such as policymakers, and managers (23, 24). Co-creating iSAMs enhance contextual fit (20), which in this study, involves tailoring iSAMs to the childcare context for the approaches to be responsive to the WASH service needs of children in informal settlements (16, 22). Co-creation also enhances readiness for change, which is vital for behavior change for the iSAMs to be successfully implemented (22, 25). Instead of only relying on

Abbreviations: APHRC, African Population and Health Research Center; ESRC, Ethics and Scientific Review Committee; FGDs, Focus Group Discussions; iSAMs, informal Social Accountability Mechanisms; LMIC, Low-and Middle-Income Countries; LSTM, Liverpool School of Tropical Medicine; NUHDSS, Nairobi Urban Health and Demographic Surveillance System; SAMs, Social Accountability Mechanisms; SDG, Sustainable Development Goal; WASH, Water, Sanitation and Hygiene.

theory to guide the creation of approaches, local knowledge regarding structures and values must be utilized collaboratively (20, 23). The collaboration can include the development of an agenda, design and/or implementation (23), with the implementation process often not considered (26). Although many benefits of involving key actors in developing implementation approaches have been proposed (25), few studies have explored co-creation processes concerning iSAMs (27, 28) and evaluation of the co-creation process. Therefore, this study seeks to document a co-creation processes for WASH service delivery in childcare centers and a self-evaluation of the co-creation process. In addressing these objectives we employed qualitative and participatory study methodologies of workshops and focus group discussions to answer the following questions: (1) how does the co-creation process of iSAMs operate in WASH service delivery in childcare centers? and (2) how do stakeholders self-evaluate the co-creation process?

Conceptual framework

Co-creation requires collaboration and capital that is notably key in WASH service delivery in childcare centres. As such, this study is grounded on Coleman's foundations of social framework, with a focus on human, physical and social capital, and their interactions. Specifically, the aim of Coleman's concept of social capital is to apply the economists' principle of rational action in the analysis of social systems without discarding social organization in the process. Notably, Coleman's framework suggests that an individual and social groups make rational choices (i.e. individuals engage in social interactions, relationships and networks for as long as the benefits persist) in all phases of social life (29). These rational actions are set in a particular social context accounting for not only the actions of individuals, but also the development of social organization (Figure 1). The framework depicts a causal chain linking individual and organizational levels through intermediate steps. As such, accountability process contributes to observable performance, which are beneficial to many actors via relational accountability steps by a few actors. This is inspired by Coleman's concept of a 'boat' linking macro-level conditions and outcomes via micro-level conditions (30).

The framework informed our study as iSAMs are created to guide members to reach a consensus and make decisions highly relevant to a particular context, more so where primary actors play a key role in supporting access to WASH services (31, 32). Further, it applies to our context where defined accountability mechanisms can bring forth desirable organizational outputs and outcomes (fulfilling WASH needs in childcare centres) through intermediate steps. Similar to Coleman's ideas, the organizational outputs

from co-creation of WASH service delivery will not only benefit the individual who were involved but also other actors in general. This is because social capital is both a private and public good benefiting everyone in the social group, not only those who invest in associations or networks. The notion that 'direct contributions by some individuals will benefit the whole, not just the individual' could be an anticipated limitation for participation. However, in this study it enabled the researchers to sample dedicated participants, who willingly volunteered throughout the co-creation process.

Methods

The study is reported per a set of standardized criteria for reporting qualitative research (COREQ) (33).

Study objectives

Our study sought to document (a) co-creating iSAMs processes and (b) self-evaluation of the co-creation process for WASH service delivery in childcare centers within Nairobi's informal settlements.

Study design

This was a qualitative study, using focus group discussions (FGDs) and stakeholder participatory workshops. Focus groups are semi-structured discussions with groups of 4–12 people that aim to explore a specific set of issues. Moderators often commence the focus group by asking broad questions about the topic of interest, before asking the focal questions. Participatory workshops entail a semi-structured discussion, with ~20–100 participants, who are deliberating on an issue and are usually complemented with FGDs. Although participants in FGDs and workshops get to individually answer the facilitator's questions, they are encouraged to talk and interact with each other. FGDs and workshops are built on the notion that group interaction encourages respondents to explore, reflect and clarify individual and shared perspectives, and adopts a collaborative participation pathways (33). Collaborative participatory pathways equitably involve community members, researchers, and other stakeholders in the research process, recognizing and maximizing the importance of their diverse contributions (34). In our study, the aim of collaborative participatory pathways through FGDs and workshops was to create a positive, transformative, and sustainability together with, for, and in communities. Additionally, collaboration enhanced a bottom-up approach to co-creation in WASH service delivery in childcare centers. This is because the process ensured a platform for many

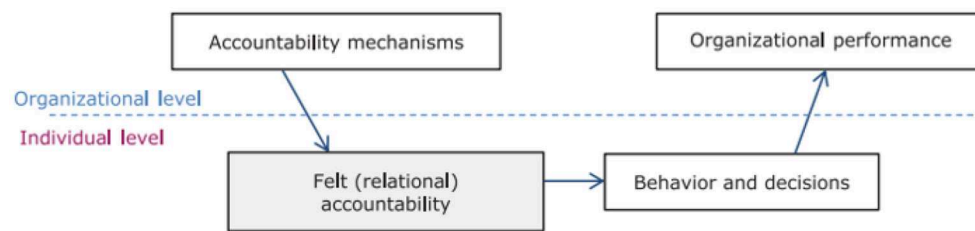


FIGURE 1
Conceptual framework (adapted from Coleman's boat applied to accountability).

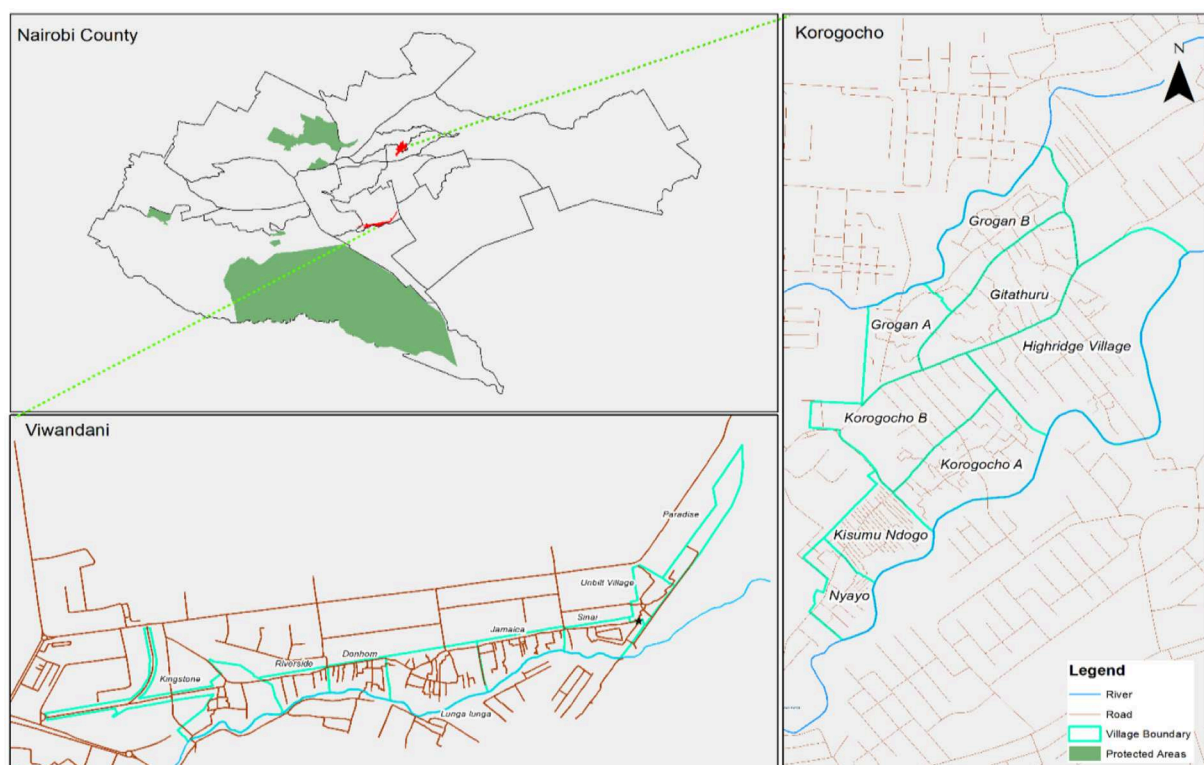


FIGURE 2
Study setting.

key actors to be heard and room for diversity, differences and desires.

Study setting

The study was conducted in Korogocho and Viwandani informal settlements in Nairobi, in the areas covered by Nairobi Urban Health and Demographic Surveillance System (NUHDSS) initiated in 2002 by the African Population

and Health Research Center (APHRC) (35). Korogocho has a stable and settled population and residents have lived in the area for many years (36), while Viwandani is located next to an industrial area with many highly mobile residents who work or seek jobs in the industrial area (36). There are ~50 and 60 childcare centers in Korogocho and Viwandani, respectively with poor or no access to WASH services (32). ISAMs facilitated and enabled access to water, sanitation and hygiene services in childcare centers in both settlements (16). Each of the study sites is divided into

TABLE 1 Sample size and demographic information.

Characteristics (sex of participants)	Childcare managers (n)	Parents (n)	Total (N)
Korogocho (n)			
Female	24	40	
Male	10	26	
Total	34	66	100
Viwandani (n)			
Female	24	50	
Male	10	16	
Total	34	66	100

8 units/villages or polygons for ease with sampling (see Figure 2).

Target population, sampling and sample size

The population of interest was childcare managers and parents with children under 5 years attending childcare centers. We sampled 100 participants comprising 34 childcare center owners catering to children under-5 years and 66 parents of children under-5 years attending the childcare centers in each of the two study sites. The participants took part in both the FGDs and the participatory workshops complemented with FGDs. Childcare center managers were selected if they were serving children in more than one of the 8 units in each of the study sites, this allowed a diversity of ideas. For each of the centers where the center managers were purposively recruited, at least two parents with a child in each of the centers were purposively selected (Table 1). We purposively selected parents/guardians who were key for child expenses in the family and who had children in childcare centers for the longest time compared to other parents. The length of stay was important as it portrays that they would likely participate in the study that entailed a series of participation.

Data collection process

We collected data in the two study sites from December 2021–May 2022 using FGDs and a workshop guide that had questions related to (a) co-creating iSAMS processes for WASH service delivery in childcare centers and (b) self-evaluation of the co-creation process. FGDs enabled the study participants to describe the steps to co-create the iSAMS process in the

silos groups, while participatory workshops enabled the study participants to discuss and have a consensus on a combined co-created iSAMS process and to self-evaluate the process. The data collection process is further detailed and described in Figure 3.

At the formative stage, trained research assistants administered eight FGDs to parents of children attending childcare centers and four FGDs to childcare center managers in each of the two study sites. FGDs comprised a group of 8–10 participants and were mainly held at community halls identified by the study participants. Our data collection team comprised of a moderator, a note-taker and a team leader. The moderator guided the discussion, the note taker took notes and observed non-verbal cues, and the team leader's role was to oversee and troubleshoot any problems, clarify any issues or questions, consult with senior researchers, and perform spot checks to enhance the quality of data. The FGDs recorded sessions took ~45–60 mins.

Four series (two in each study site) of participatory workshops were held with ~50 study participants who were involved earlier in the FGDs. Each workshop was composed of approximate participants who were drawn from two groups of FGD members with childcare center owners and from four groups of FGD members with parents. The workshops took ~90 mins of recorded sessions. After each of the workshops, participants would sit in FGD sessions for ~45 mins to reflect and self-evaluate the iSAMS process. We collected data using audio recordings, flip charts, as well as workshop materials such as slides.

Data quality control

Research Assistants were selected by researchers at the APHRC staff if they had at least 5 years of experience in qualitative research and were endorsed by the community in the study sites. The Research Assistants were trained for 5 days on the aims of the study, data collection process, data collection tools, facilitation of the co-creation process and research ethics. During fieldwork, field supervisors accompanied the research teams to ensure that probing was done correctly and to assess any threats to data quality. Debriefing sessions were held at the end of each working day to highlight the key findings, review probing techniques, and assess progress.

Data analysis

The recordings from participatory workshops and FGDs were transcribed into MS Word and cross-checked by a third party to ensure that all the information had been captured in the transcript. The transcripts were translated from Swahili to English (where necessary) and again cross-checked to ensure that the translation did not alter the meanings of the data.

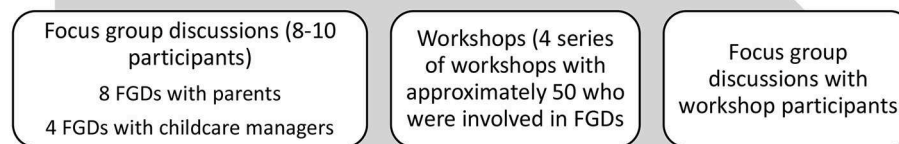


FIGURE 3
Data collection process.

Transcripts were imported into NVivo 12 software (QSR International, Australia) for coding and analysis. Each transcript had a unique identifier comprising of date, study site and sex of the participant to enhance anonymity and facilitate informed analysis.

We used a framework analysis (37), informed by Coleman's framework (29). Framework analysis is adopted for research that has specific questions, a pre-designed sample and priority issues (37). The first step of framework analysis was listening to the recordings to familiarize the researchers with the information related to co-creation processes and self-evaluation of co-creation. To ensure reliability, two researchers (an experienced qualitative researcher with WASH experience and an anthropologist) and five co-researchers, who collected the data participated in the development of a coding framework by reading the outputs imported in NVivo 12 software independently, to establish an inter-coder agreement. Once the initial coding framework was completed, the team met to discuss the themes generated and to reach an agreement on themes. Two researchers proceeded with coding, charting, mapping and interpretation of transcripts, guided by agreed themes and codes (Table 2). The themes and codes had two domains of process and evaluation.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki, and approved by AMREF Health Africa's Ethics and Scientific Review Committee (ESRC), REF: AMREF-ESRC P747/2020. We obtained a research permit from National Commission for Science, Technology and Innovation (NACOSTI), REF: NACOSTI/P/20/7726. Approval was also obtained from the Liverpool School of Tropical Medicine (LSTM) and the African Population and Health Research Centre (APHRC) internal ethical review committees. All participants

TABLE 2 Codes and themes during analysis.

1. The process of co-creating an informal social accountability mechanism	
Codes converted into themes	
(a) Defining accountability to whom and for what?	
(b) Performing/ action and information	
(c) Judging and assessing performance	
(d) Learning and adapting	
(e) Key outcome-Met WASH needs of children	
2. Self-evaluation of the co-creation process	
Major themes	Emerging themes
1. Positive appraisal	(a) Improved understanding in childcare centers (b) Enhance inclusion and ownership (c) Tailoring of activities into relevant context (d) Improved performance and better outcomes
2. Negative appraisal	(a) Time constraints (b) Financial burdens (cost of implementing the process) (c) Few committed participants and leaders (d) Lack of consistent commitment to participate

provided informed written consent before participating in an interview including consent for using photos and videos if there were any.

Results

In total 200 participants took part in our study, comprising childcare managers and parents (see Table 1) in the Methods section. We identified two domains (1) processes of co-creating

iSAMs and (2) self-evaluation of iSAMs as summarized in Table 2.

Co-creating an informal social accountability process

Data captured through FGD and workshops fed into the co-creating process. The iSAMs process co-created entailed four iterative steps that were proposed by participants to potentially improve WASH service delivery in childcare centers. The steps included (1) defining accountability, (2) action and information on social accountability actions based on definition(s), (3) making judgements and assessing performance about the appropriateness of the actions (affirming or imposing sanctions for unsatisfactory performance) and (4) learning and adapting based on judgements and assessment (Table 2). The four key steps identified by study participants were proposed to ultimately improve access to WASH services in childcare centers (see Figure 4).

Step one: Defining accountability to whom and for what

The study participants agreed that this was the first step of the co-creation model. Parents and childcare managers described the importance of the collaborative definition of accountability to whom and accountability for what? The study participants described the importance of accountability to children and to each other as the key actors in childcare centers, for access and utilization of WASH services and products by the children in childcare centers.

“It is key to define accountability, for example, I am accountable to the child and the parent of the child because they are the reason why I am in this centre” (Female Childcare center manager, Viwandani, 2022).

“I am accountable and by the way, parents need to be accountable to childcare centre managers and the children as well. It is important to define and agree because some parents think that they are only accountable to their child” (Female Parent, Korogocho, 2022).

In addition, parents felt the definition of accountability could enable parents to explore further on “accountability to whom” as such, parents thought they were accountable to not only childcare center managers and children but also to their neighbors. Childcare center managers also agreed on the same and described that they were also accountable to the government and local authorities.

“When we define accountability to whom, we get to think further. As parents, we are also accountable to our neighbours. For example, if I do not ensure children have access to water,

sanitation and hygiene at the centre, the children might not access, be sick and disturb the neighbours because we share sanitation facilities at home” (Female Parent, Viwandani, 2022).

“If we find a good time to define accountability to whom, it becomes an opportunity to think of actors we are accountable to. We are also accountable to the government and other authorities” (Female Childcare center manager, Korogocho, 2022).

There were dynamics in the definition of accountability for what. Male parents described that there was no need to define accountability for what as they thought they would forget, while female parents embraced the need to define the same, as they thought it could catalyze accountability.

“I think it is just ok to define accountability to whom; accountability for what is not necessary... this is because one can easily forget what they subscribed to and what they did not” (Male Parent, Viwandani, 2022).

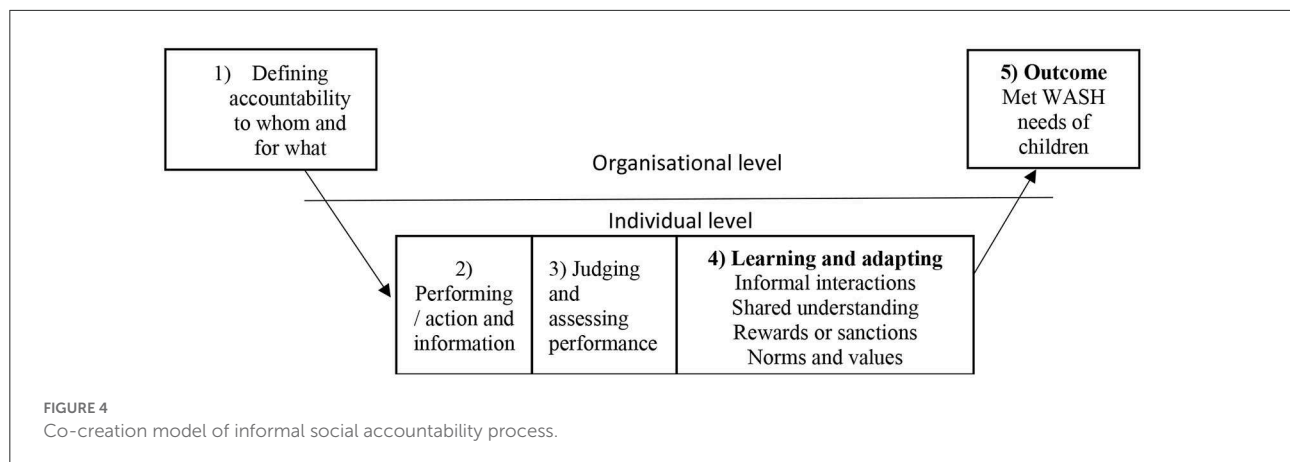
“It is important to define accountability for what so that the centre manager can be keen on what you all agreed” (Female Parent, Viwandani, 2022).

Step two: Action and information on social accountability actions

Study participants described how once accountability for WASH service delivery is defined, there is a need for the key actors (parents and childcare center managers) to act by ensuring the provision and utilization of WASH amenities by children. Parents described that their roles could include payment of childcare fees to enable childcare managers to purchase WASH amenities, or sometimes parents could purchase WASH amenities for children and deliver them to childcare centers. Parents expressed the willingness to prioritize availing the WASH needs of children in childcare centers, even when they lacked the amenities at their homes, as parents did not want to be interrupted by center managers at work for failing to avail the amenities.

“Once the roles are defined, it is important to act by availing water, sanitation and hygiene amenities in childcare centres, payment of a fee for the childcare centre managers to purchase the amenities or by referring supporters to the centres” (Female Parent, Viwandani, 2022).

“I am ready to forgo having water in my house but ensure that the child access water and sanitation in the centre. This is because, I do not want to be interrupted by calls on the WASH needs by the centre managers, while I am at work” (Male Parent, Viwandani, 2022).



"I usually do not like my children to suffer when they are young. Anything we agree with the centre manager, I just avail; be it a fee or anything agreed. You know children spend most of their time there" (Male Parent, Korogocho, 2022).

Center managers described the importance of availing WASH services and ensuring that children could utilize the amenities in the childcare centers.

"It is important to avail water, sanitation and hygiene services and products in childcare centres for children to use" (Male Childcare center manager, Viwandani, 2022).

"Childcare managers should always act to ensure children use the water, sanitation and hygiene services and products at the center. There are times when I train children on the use of the WASH amenities" (Female Childcare center manager, Korogocho, 2022).

Despite the willingness of many parents, study participants described that in some instances, some parents could not avail WASH services due to their inability to oblige to pay the fee or to avail the WASH amenities and products. This was reported to affect WASH service delivery.

"There are some times when we are not able to avail adequate WASH amenities; more so when parents fail to take their responsibility of paying a fee or availing facilities at the centre" (Male Childcare center manager, Korogocho, 2022).

"Some parents are not able to avail WASH facilities or products in childcare centres or pay the fee. They affect the ability of childcare centre managers to provide the amenities in the centres" (Female Parent, Viwandani, 2022).

Step three: Judging and assessing performance

Judging and assessing performance/action was thought to be key for continued provision and utilization of WASH amenities. As such, during action/performance, participants agreed on the importance of assessing the progress of action/performance.

"Parents should monitor how children use WASH facilities and how Childcare managers are present to give guidance when needed. On the other hand Childcare managers should monitor how parents are responsible for availing WASH products for use in the centre." (Male Childcare center manager, Korogocho, 2022).

The assessment could potentially happen in many forms through visits to a childcare center.

"It is always good to assess performance. While taking my child to school, I confirm if the centre has potty/toilet facilities and drinking water" (Male Parent, Korogocho, 2022).

"I find it important to visit my child in the centre at least once in a month to confirm if the child is being attended to and could utilise available water, sanitation and hygiene facilities" (Female Parent, Viwandani, 2022).

"I sent her older sister to go and check if the child could access water and sanitation facilities at the centre and if there is someone guiding the child" (Male Parent, Korogocho, 2022).

Some parents, most of whom were male, were committed to other duties and did not visit the childcare centers. As such, the parents would do an assessment of WASH amenities and service delivery digitally hence, the need for the iSAMs process as a support to effective social accountability.

"I usually ask the parents who take children to the centre on my behalf to find out about the status of WASH in the centre, where possible I ask them to take a photo of WASH facilities and share it with me" (Male Parent, Korogocho, 2022).

"In many cases, I ask my neighbour who constantly visits the centre to take some photos of the facilities and share them during her visits" (Male Parent, Viwandani, 2022).

Judgement and assessment could also be done through reports.

"I have to report to parents when they fail to meet what we agreed on regarding provision of WASH services... sometimes through a written note or phone calls" (Female Childcare center manager, Viwandani, 2022).

"As parents, we ask children to report on access to WASH facilities while at the centre. Although very young children could not report effectively" (Male Parent, Korogocho, 2022).

Step four: Learning and adapting informal social accountability mechanisms

Study participants described how the assessment/judgement step led to learning and adapting informal social accountability mechanisms that included informal interactions, shared understanding, rewards, sanctions, norms and values among others; ISAMs identified in an early study (16).

"If a centre manager is doing well, it is important to reward them as parents. The rewards are usually in form of availing free water or paying extra money for their good task ... the rewards can be adapted over time to always be effective" (Female Parent, Korogocho, 2022).

"For parents who are not compliant with what we agreed, it is good to communicate with them, encourage and train them to pay in instalments for their children to access WASH facilities. However, when they cannot improve in their compliance, we do not allow them to bring their children to the centre" (Female Childcare center manager, Viwandani, 2022).

Step five: Key outcome—Meeting the needs; WASH needs

Study participants described how learning and adapting informal social accountability mechanisms have the potential of enabling the actors to achieve the performance of WASH needs in childcare centers.

"It is with the four steps that children could have access to water, sanitation and hygiene services in the childcare centres. This is because both parents and childcare centres are involved and responsible" (Male Childcare center manager, Korogocho, 2022).

Positive self-evaluation of the co-creation process

Improved understanding of childcare centers and building trust for WASH service delivery

Respondents mentioned that the discussions during the co-creation process resulted in new insights and awareness regarding childcare center operations, challenges, values and WASH service delivery.

"One thing I take with me is that the childcare manager is investing in these matters {accountability for WASH service provision}. It is valuable to see that there is an ongoing concern. They take these matters seriously and engage with parents. So, it feels good" (Female Parent, Viwandani, 2022).

Increased learning about accountability for WASH was mentioned, in that working with the researchers contributed to a more profound understanding of different aspects of social accountability and its relationship to WASH service delivery. The respondents described that, even though the concept of social accountability was not new to them, it was somewhat difficult to grasp and fully understand its practical meaning. The concept was operationalized and applied in their local context which then contributed to their greater understanding of the issues in focus. One participant whose views represented those of the majority described this in terms of getting a new, mutual and practical language.

"So, the centre has gotten a lot out of this co-creation work. We as individuals have got a language, we had never used the word accountability before, but I have done so now. Yes, so we have learned and gotten a lot out of this, the language seems practical to us" (Female Childcare center manager, Korogocho, 2022).

Enhance inclusion, ownership and a satisfying co-creation process

Study participants acknowledged how the co-creation process was mutual and both parents and center managers shared responsibilities. The participants noted that there was a great engagement of all during the workshop, a good grounding in the concepts, and informative with a great diversity in the participants. As such, the

respondents expressed that they were satisfied with the balanced responsibilities and ownership throughout the whole process.

"We have tried to take responsibility and we have felt a sense of inclusion and ownership in the process, therefore, we are satisfied with the entire process, we deliberated a lot" (Female Childcare center manager, Viwandani, 2022).

Many respondents expressed satisfaction with the collaboration in the overall co-creation structure as there were representatives of different primary actors. The participants perceived the co-creation process as straightforward, and a helpful tool to identify outcomes and processes. Some respondents desired to try the model for other service delivery challenges other than WASH.

"We do not have everyone involved but as representatives, it becomes easier for us to convince others. I will convince other parents. Childcare managers who are here will also convince their colleagues to apply the process to WASH service delivery and other services" (Male Parent, Viwandani, 2022).

Time, date and other plans of conducting FGDs and workshops were participants-led, as such, respondents expressed satisfaction in the process. Several respondents also expressed contentment with being listened to and said that they had the opportunity to have their voices heard.

"We were allowed to choose the best time to attend the session and we committed to the sessions. I think the researchers listened to us like never before. Which was helpful to all of us" (Female Childcare center manager, Viwandani, 2022).

Tailoring of activities and strategies into relevant context

Study participants described how Involving childcare managers and parents during the co-creation of iSAMs enabled a good contextual fit, as the activities were relevant to the context. The participants also termed the activities to have enhanced willingness to implement the process. This could be seen as an example of tailoring activities and processes, not only for improved WASH service delivery but also to simultaneously contribute to the overall performance of a childcare center.

"I think that the processes are relevant to us; activities are fully relevant, and I think it will lead to good accountability for WASH service delivery and other outputs in the centre" (Male Childcare center manager, Viwandani, 2022).

"The process leads to learning from each other directly and can bring so much value to WASH service delivery in childcare centres" (Male Parent, Korogocho, 2022).

Potential for improved performance and better outcomes

While self-appraising the use of co-creation between the childcare managers and the parents regarding WASH service provision, it was unanimously agreed that co-creation had the potential to enhance WASH service delivery outcomes. Childcare managers and parents engaged in this process as they believed it would improve WASH service delivery in childcare centers.

"In due course, with co-creation of social accountability mechanisms process by parents and childcare centres in WASH service delivery, it is likely that children may have better WASH services" (Female Childcare center manager, Korogocho, 2022).

"It's been a great partnership, with true successes. The process has enabled ownership of approaches and sharing of skill sets. We incorporated some activities during this period and are in the process of incorporating others going forward" (Female Parent, Viwandani, 2022).

Negative self-evaluation of the co-creation process

Study participants identified various challenges to effective co-creation. These challenges were around timing and organization. Further, the participants described how it could be challenging to consistently have committed local contributors and committed leaders.

"Amount of time that goes into the co-creation process can be challenging... the entire steps consumes a lot of time" (Male Parent, Viwandani, 2022).

"I needed to be at a community forum but I had to give an apology so that I could join this meeting" (Female Childcare center manager, Viwandani, 2022).

"Lots of people usually want to contribute liberally, but I do feel it needs some strong leadership from all actors involved" (Male Parent, Korogocho, 2022).

A final challenge was a need to ensure effective co-creation and positive outcomes, with limited resources and planning, while taking cognizant of social, structural and economic

challenges of the local context in the informal settlements. As such, most parents and childcare center owners who were underprivileged compared to the ones who were privileged raised this concern. For instance, some parents reported a lack of finance to purchase WASH facilities for their children. Several of the childcare center owners and parents were positive but pointed out a lack of consistent commitment by some actors to perform their roles.

“One challenge is the lack of consistent commitment of partners and stakeholders to do the needful that will promote co-creation” (Female Childcare center manager, Korogocho, 2022).

“The co-creation process was good but sometimes; we have inadequate resources and cannot afford to purchase potties, soap, water or buckets for hand washing” (Female Parent, Viwandani, 2022).

Discussion

Sustainable Development Goal (SDG) target 17 implicitly recommends a co-creation approach to achieving sustainability in service delivery because it emphasizes the central role of partnerships, equally, target 6.b focuses on a need for participation of local communities in water and sanitation planning and management (38). Partnerships among researchers, parents and childcare managers during co-creation served as “force multipliers” in generating collaborative ideas that could lead to sustainable solutions. Co-creation has a potential to mobilize collective energy, harness distributed knowledge and resources, engage in processes of mutual learning, develop prototypes and implement new and bold solutions that can be jointly evaluated and improved (38). By drawing together varied perspectives of actors, co-creation fosters nuanced problem understandings and mobilizes the local knowledge and other resources crucial for context-sensitive local solutions. This study explored the co-creation process of iSAMs for WASH service delivery in childcare centers in two informal settlements in Nairobi, Kenya, and the self-evaluation of the process using FGDs and workshops. The co-creation process in our study involved collaboration and contributions by childcare managers and parents, who are key actors in WASH service delivery in childcare centers in informal settlements (32). Co-creation depends on increased cooperation as well as strong partnership processes between different stakeholders. Notably, the study participants identified (1) four steps of co-creating iSAMs resulting in an output and (2) positive and negative appraisals of the process in access to WASH services by children in childcare centers. Further interrogation and analysis of the iSAMs process and self-evaluation in the two study sites did not show any difference.

Co-creation processes in other contexts describe iterative processes, which are closely related to our findings. For example, a co-creation process that involved employees defined four building blocks of the process: (1) providing structure in the creation process, (2) implementing motivational elements, (3) creating emotional proximity and ownership, and (4) offering feedback on learning material for quality assurance (22). The co-creation process however involved one set of actors (employees). Our study will add to the literature as both the users (parents) and providers (childcare managers) were involved in describing the building blocks of co-creation using two qualitative approaches; FGDs and workshops. The co-creation process output entailed (1) defining accountability to whom and for what?, (2) performing/action and information, (3) judging and assessing performance, (4) learning and adapting, the four steps were intended to lead to (5) a key outcome of meeting WASH needs of children in childcare centers. It was clear that FGDs and participatory workshop approaches for co-creating iSAMs were of great value, as the participants were beneficiaries of the output and had attribution in the process. Consequently, we grounded this work on Coleman’s framework with a focus on social capital and stressing the role that individuals play in an organization (29). The framework was key in planning and development of the iterative process. This is because the organizational outputs from co-creation of WASH service delivery will not only benefit individuals who were involved but also other actors in general. For example, an improved WASH service delivery output as a result of co-creation will benefit all children in childcare centres, including children of parents who were not involved in the process.

Positive appraisal of the co-creation process included equal involvement and collaboration of study participants. Collaborative influence over the process was linked to enhanced WASH service delivery in childcare centers. In preceding studies, the need to co-create strategies to access WASH services in public spaces including childcare centers have been stressed to be important (27, 28), to counter the narrative that collaboration of explicit strategies is often left out in participatory work environment (21, 38). This implies that the process fostered a good fit into the context, a gap that was identified in the introduction section. The use of co-creation by researchers, end-users, and other relevant stakeholders when developing interventions is increasingly encouraged (21). However, few studies have described a co-creation process and self-evaluation of the process or more distal outcomes such as improving access to WASH needs among end-users (22, 28). As such, to our knowledge, this is the first study documenting the co-creation process and self-evaluation of the process in WASH service delivery in childcare centers, so as to fill in the gap. This study adds to practice by documenting the co-creation process and self-evaluation of the process that can be adopted by actors for improved outcomes. As mentioned in the introduction, defining an implementation strategy and involving end-users in

co-creation appears rare (19, 21). An insight from our findings is that end-users can be involved in the co-creation process and can provide a distinction between the process and the outcome. Despite the positive appraisals, there were negative appraisals that included the ongoing collaborative nature of co-creation which is time-consuming and requires a lot of organizational skills for a meaningful and successful deliverable. The balance of who and how many people to involve, to ensure progression yet still ensure an inclusive process, alongside ensuring the process is driven forward by somebody taking the lead role as noted by our study participants can pose a challenge, as can the selection of less motivated partners. These negative appraisals and concerns do not negate the very positive effects of co-creation, but need identifying at an early stage while planning on co-creation approaches.

Our findings imply that sustainable and equitable WASH service delivery in childcare centers in informal settlements needs research that goes beyond raising awareness to fully engage and collaborate to ensure that novel solutions are developed at an appropriate scale to meet specific needs (21, 25). Applying co-creation can be a valuable method for adopting iSAMs and facilitating service delivery. As such, there is a need to integrate co-creation in already existing structures in childcare centers (16). Co-creation process can identify multiple solutions to WASH service delivery, which can be adapted and tailored to childcare centers.

Strengths and limitations

Our strengths included strong networks in the study sites, well-trained and skilled data collectors recruited from the community and the ability to use an existing framework for analysis. This heightened our drive towards the validity of the study results. Our study is not without limitations. This study was conducted in only two informal settlements in Nairobi with key stakeholders in childcare centers. The findings were necessary for exploring the co-creation process and self-evaluation of co-creation for WASH service delivery in childcare centers. Nonetheless, a more holistic approach that combines qualitative and quantitative data, and integrates more stakeholders would be necessary for a broader understanding of the many aspects of the study, moving forward.

Conclusion

First during the co-creating process, actors realize their potential during initial engagement meetings (i.e., that they are not only capable of producing innovative, yet feasible solutions, but they also help to build broad-based ownership to new and bold solutions), thus enhancing democratic legitimacy. Second, collaborative interaction in co-creation arenas tends to empower the participating actors and build resilient communities that

are capable of bouncing back when facing stress, turbulence or disruptive crises. Third, the co-created process identified in our study seems to be feasible in childcare centers elsewhere in Kenya and other LMIC settings. This is because the process reduces contextual barriers which are often overlooked, as it allows understanding of issues through the “eyes” of people who experience service delivery issues. Consequently, other users and service providers could adopt the co-creation process and streamline the same for quality service delivery in the WASH sector and other sectors. Fourth, prioritizing co-creation can effectively identify tailored approaches to strengthen WASH service delivery. These approaches could provide a model to guide future local participatory action research for improving WASH service delivery and other basic services in Kenya's informal settlements and other under-resourced settings. Fifth, our co-creation process model could be further enhanced by a “champion” or an “implementation team” for sustainability. The process can form a locally tailored model, which encourages the engagement of more vulnerable members and disadvantaged groups, leading to improved outputs across communities. Ensuring more actors have an equitable seat at the table can contribute to the good governance needed to strengthen WASH systems and achieve SDG 6 targets for water and sanitation. To support this, there is potential for key actors to focus on “quick win” solutions, as it offers insight and recommendations for co-designing, co-production and co-creation of local knowledge and practical solutions that could be scaled up to operationalize social accountability more widely.

Lastly, situational leadership aiming to diagnose problems and to try out different solutions is called for and will often trump any list of recommendations, more so in informal settlements, where service delivery is dominated by informality. Despite that many local change makers might not get as far as initiating, leading and managing co-creation processes in informal settlements, and that many governments, economic elites and local power-holders may suppress social entrepreneurship and unsolicited social action. Fortunately, in Kenya, government actors and elites welcome bottom-up initiatives, similar to our process that could help to solve urgent problems and achieve important sustainability goals such as those captured by the SDGs, including partnerships in WASH service delivery in informal settlements. Overall, sustainable and equitable WASH service delivery in childcare centres in informal settlements needs research that goes beyond raising awareness to fully engage and co-create to ensure that novel solutions are developed at an appropriate scale to meet specific needs. We recommend that actors should integrate co-created approaches in already existing structures for water, sanitation and hygiene service delivery in childcare centers and in other contexts. Future research should aim to understand factors that promote the integration and sustainability of functional social accountability processes aimed at improving the WASH services.

Plain English

Parents and childcare managers play a key role in provision of water, sanitation and hygiene for use by children in childcare centers in informal settlements. There are approaches referred to as “informal social accountability mechanism” used by both parents and center managers to hold each other responsible for service delivery. To date, the approaches have shown a limited effect, often due to implementation failures and poor contextual fit. As such, we explored the approaches and documented the process and appraisals by involving both parents and childcare managers. We identified a four-stepped process that led to an outcome and both positive and negative appraisals of the process. We conclude that sustainable water, sanitation and hygiene service delivery in childcare centers in informal settlements needs research that goes beyond raising awareness to fully engage and co-create feasible novel solutions to meet specific water, sanitation and hygiene needs. We recommend that actors should integrate co-created approaches in already existing structures for water, sanitation and hygiene service delivery in childcare centers and in other contexts.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The study was approved by AMREF Health Africa's Ethics and Scientific Review Committee (ESRC), REF: AMREF-ESRC P747/2020, and a research permit from National Commission for Science, Technology and Innovation (NACOSTI), REF: NACOSTI/P/20/7726. Approval was also obtained from the Liverpool School of Tropical Medicine (LSTM) and the African Population and Health Research Centre (APHRC) internal ethical review committees. All participants provided informed written consent before participating in an interview including consent for using photos and videos if there were any. The patients/participants

provided their written informed consent to participate in this study.

Author contributions

Conceptualization, data curation and analysis, methodology, project administration, and first draft: IC. Validation: IC, CK, HE, PP-H, and BM. Review and editing: IC, CK, HE, KO, PP-H, and BM. Supervision: PP-H, HE, and BM. All authors approved the manuscript for submission.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Preschool experiences and home learning environments of migrant children in urban China

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Internal migration and urban expansion, hallmarks of rapid urbanization in China, have led to an increasing number of children with diverse backgrounds in cities. Cities now include migrants from rural and urban areas, and children from “urban villages” in addition to “urban locals”. Parents of young children who migrate from rural to urban areas leave their children behind in rural areas (“left-behind” children) or take them along with them. In recent years, increasing parental migration from one urban area to another has also led to children being “left-behind” in urban areas. This study examined the preschool experiences and home learning environments of rural-origin migrants, urban-origin migrants, and rural-origin locals in comparison to urban locals, leveraging data from the nationally representative China Family Panel Studies (2012–2018) with 2,446 3- to 5-year-olds residing in urban areas. Regression model results indicated that children living in cities who held a rural household registration certificate (*hukou*) were less likely to attend publically funded preschools and experienced less stimulating home learning environments than urban local children. After controlling for family characteristics (i) rural-origin locals remained less likely to participate in preschool and experienced fewer home learning activities than urban locals; and (ii) there were no differences in preschool experiences and home learning environments between rural-origin migrants and urban locals. Mediation analyses suggested that the relation between *hukou* status and the home learning environment was mediated by parental absence. Implications of the findings are discussed.

KEYWORDS

educational inequality, preschool education, home learning environments, migrant children, China

1. Introduction

Since 2008, over 50% of the world’s population has lived in urban areas (1) and increasing numbers of children will grow up in towns and cities. Along with rapid urbanization, poverty and inequality are also increasing across the world’s cities. For instance, an estimated 300 million migrant children live in urban slums and experience polluted, insecure living environments or educational exclusion (2, 3). China is one of the most rapidly urbanizing countries in the world. The large-scale rural-to-urban migration and the fast-growing metropolises have led to an increasingly urban population. The urbanization rate in China soared from 49.68% in 2010 to 63.89% in 2020 (4). The proportion of preschool-aged migrants has also increased in the recent decade (5). About 5.9 million 3- to 5-year-olds migrated with their parents from one part of China to another in 2015 (6). Therefore, there is a need for research on children’s early experiences in the context of urbanization to inform evidence-based policies and programs.

A distinction is made between internal migration, which occurs within a country, and external or international migration. National household registration systems such as the *hukou* in China and the *ho khai* in Vietnam present institutional barriers for internal migrants (7). Beyond East Asia, unfavorable integration policies have also adversely impacted the educational

TABLE 1 Terms used to describe children in urban China.

	Child	Current residence	Household registration	Migrant
1.	Rural-origin migrants (ROM)	Urban	Rural	Yes
2.	Urban-origin migrants (UOM)		Urban	Yes
3.	Rural-origin locals (ROL)		Rural	No
4.	Urban locals (UL)		Urban	No

outcomes of international migrants who have moved to western countries (8).

This paper focuses on internal migration in China. The urban-rural dual structure is a unique feature of Chinese society, with the household registration (*hukou*) system at its core. The *hukou* system denotes each newborn as having either an agricultural (rural) *hukou* or a non-agricultural (urban) *hukou*, depending on their parents' *hukou* status and location (9). One's *hukou* status determines where one can access public services such as healthcare and education. Urban residents who have a rural *hukou* are not entitled to access all the same public services in urban areas as local urban *hukou* holders (5, 9). Therefore, the *hukou* system has been widely recognized as an obstacle to the adaptation of new migrants in China. Without an urban *hukou*, rural-to-urban migrant children experience institutional barriers, social exclusion, and have limited access to educational opportunities. Indeed, research has demonstrated that rural-origin migrants have poorer academic performance and more socio-emotional problems than urban local children (10, 11). In order to provide appropriate support to migrant children and families, it is important to understand the reasons for disparities in early learning and development between migrant and local children.

A large number of rural areas on the outskirts of cities have been converted to new urban districts in China, and these are referred to as "urban villages". Rural residents in urban villages have been reclassified as urban residents and are referred to as rural-origin locals in this study. These urban villages are transitioning into becoming urban with an apparent mixture of rural and urban social norms, and often provide residential space for local landless farmers and provide low-cost housing for migrants (12). While rural-to-urban migrant children have received policy and research attention, the educational opportunities for local children in the urban villages are little understood.

Disparities within and across cities in China have widened due to internal migration and urban expansion, motivating migration from small towns or cities to better resourced urban areas. The number of urban-to-urban migrant children and urban children being left-behind by their parents has increased. This warrants concern as it has been demonstrated that urban left-behind children are also disadvantaged in academic performance and mental health (13, 14) compared to urban local children. However, a limitation of the existing studies in China is the tendency to exclusively focus on rural-to-urban migrant children, leading to a paucity of research on the impact of new internal migration trends (15), such as urban-to-urban migration and the impact of urban expansion on early learning and development.

Against this background, we categorized children into four distinct groups living in urban China based on their *hukou* and migrant status: rural-origin migrants (ROM), urban-origin migrants (UOM), rural-origin locals (ROL), and urban locals (UL) (see Table 1). The first two letters in the acronym denote *hukou* status. The last letter indicates whether the child is local or a migrant. Substantial evidence indicates that the quality of center- and home-based learning experiences during early childhood are positively associated with child and adulthood outcomes (16, 17). Leveraging a nationally representative sample, this study compares the early learning experiences of rural-origin migrant children, urban-origin migrants, and rural-origin locals, with urban local children. Therefore, this study extends and complements past studies that have tended to focus exclusively on rural-to-urban migrant children. Additionally, we examine the relation among early learning experiences, *hukou*, and parental absence in urban China.

2. Preschool experiences in China

In China, the term preschool education is used to denote services provided to children aged 3 to 6, either in stand-alone preschools known as kindergartens or in a one-year pre-primary class located in a primary school (18). In kindergartens, children are divided into classes based on their age, and there are three "grade" levels. Children aged 3 to 4 are in the junior class; those aged 4 to 5 years are in the middle class; and those ranging in age from 5 to 6 years are in the senior class. Children who live in rural areas where there are no stand-alone kindergartens may attend a pre-primary class for 1 year before they start Primary 1. The one-year program aims to prepare children, with no experience in a stand-alone kindergarten, for the transition to primary school. We use the term preschool to refer to education services for children aged 3 to 6 years, provided in both stand-alone kindergartens and in pre-primary classes. Furthermore, kindergartens in China can be classified as public or private depending on their funding source. Compared to private preschools, publically funded preschools (hereafter, public preschools) tend to have more stable funding from the government, are better regulated, and provide greater job stability and benefits. They are usually considered to charge reasonable fees and to be of satisfactory quality (19, 20).

Many studies have documented urban-rural and coastal-inland disparities in educational resources and children's preschool experiences (21–23). In 2010, the Chinese government launched the National Medium and Long-term Education Reform and Development Plan (2010–2020), which prioritized promoting access to preschool education in rural and less-developed central and western regions in China. With a series of preschool education policies, regional disparities in preschool attendance have narrowed (22, 24). However, regional disparities in preschool quality remain, and preschool teachers in rural areas are less qualified than their urban counterparts (24). Hu and colleagues highlighted a growing concern about the high proportion of preschool programs operated by private providers and the widening gap in the quality of private rural programs compared to public preschools or those in urban areas (25). It should be noted that while urban-rural disparities in preschool education have been documented, disparities in preschool education within and across cities in China are less well understood.

In most low- and middle-income countries, participation in preschool education is strongly related to regions of residence and family socioeconomic status (SES) (26, 27). Children in urban areas or wealthier households are more likely to participate in early childhood education programs than those in rural areas or from poor households. Studies in China have also highlighted rural and urban gaps in preschool attendance, and family SES is positively related to preschool attendance (22). Past work on the preschool attendance of migrant children has consistently reported that the preschool attendance rates for migrant children and urban local children are comparable and higher than those for children living in rural areas (23, 28). This finding is in line with the recent data from the Ministry of Education and the National Bureau of Statistics (4). In 2020, the preschool enrollment rate for migrant children aged 3 to 5 was 86.1%, slightly higher than the overall national preschool enrollment rate of 85.2%. This may be because most migrant parents are working and rely on preschools for child care.

Nevertheless, the *hukou* may hinder migrant children's access to quality preschool education. Migrant children were less likely to attend public preschools than urban local children. About 29% of migrant children attended public preschools (29), which was 21.7% lower than the national average public preschool enrollment rate (30). Besides institutional barriers, the distribution of educational resources also affects preschool learning opportunities. For example, due to the higher supply of public preschools in eastern China, migrant children who moved to eastern China had the highest rate of attendance rate in public kindergartens, followed by those who migrated to western and central China, respectively (23).

There are several reasons for the difference in rates of access to public preschools between migrant and local children in urban China (31, 32). Most migrant families live in remote urban villages because of the relatively high costs of housing in cities (12). There is a lower supply of public preschools in urban villages and children with a local *hukou* are given enrollment priority. Migrant children are only likely to be admitted to public preschools if vacancies arise (31). Their parents are less familiar with the process and report difficulties in completing the complex steps to secure admission to public preschools. Furthermore, as migrant families are usually economically disadvantaged, they typically resort to sending their children to low-cost private preschools, which may be of low quality.

The Seventh National Population Census revealed new trends of internal migration in China with a marked increase in the urban-to-urban migrant population (4, 15). Yang and Xie (23) compared the preschool experiences of urban-origin migrants and rural-origin migrants drawing on the 2013 National Migrant Dynamic Monitoring Survey. They found no significant difference in their general preschool enrollment and that a higher percentage of urban-origin migrants accessed public preschools than rural-origin migrants. This finding suggests that urban-origin migrants may experience few institutional barriers and benefit from better educational resources in cities.

3. Home learning environments in China

Home learning environments (HLEs) refer to caregiver-child interactions that occur regularly at home and through which children acquire knowledge and skills. Along with national economic

development and increased levels of educational attainment, parents in China have invested more time and money to support the learning and development of their young children. Nevertheless, regional and urban-rural disparities in HLEs remain significant. Children in urban areas and in more economically developed regions tend to receive more learning stimulation than those in rural and less developed regions (33). Furthermore, as parents in urban China are exposed to the influences of globalization, their parenting practices differ from those in rural areas. Child-rearing practices of urban parents reflect both traditional Chinese values and western notions of child-rearing (34).

Higher SES is associated with more stimulating HLEs (33, 35–37). When family income levels are similar, caregivers with higher levels of education are more likely to provide enriching HLEs to their children than parents with lower levels of education (38). Additionally, research has uncovered an indirect relation between caregivers' psychological distress and learning stimulation in low-income families. Caregivers in low-income families are more likely to experience financial hardship than other families. This increases their stress level and decreases their ability to be involved with their children (35). Besides family SES, the family structure and childcare arrangement also affect HLEs. Two-parent families are considered to be a more stable structure and beneficial for children's development, compared to single-parent families or multigenerational households (39, 40).

Studies have found that the home environment and parenting practices for migrant children and urban locals in early childhood vary (41, 42). Migrant children had a higher home chaos score than urban locals, indicating that they may experience a more disorganized, crowded, and noisy living environment (42). Qualitative studies have shown that migrant parents lack appropriate knowledge and skills and provide limited learning stimulation to their children (43, 44). For example, they tend to prioritize academic skills over socio-emotional development and overlook the important influence of home environments on the development of young children. Furthermore, many migrant caregivers are primarily engaged in jobs that demand long working hours and render relatively low wages, and thus may have less time and resources to promote their child's learning. A more recent study found that the childrearing beliefs and practices of migrant mothers in urban villages in mega-cities in China (Guangzhou and Shenzhen) approximated those of urban middle-class mothers (45).

Few studies have considered differences between rural-origin migrant and rural-origin local children. They share the characteristics of holding a rural *hukou* in urban areas, and many of them may live in urban villages. When urban villages underwent a transition from rural to urban social systems, both the extent of educational resources available and the parenting beliefs of original villagers did not change substantially during the urbanization process (46, 47). Within urban villages, local families tend to have greater financial resources than rural families. Most rural-origin local families are no longer involved in farming, and some of them have stable rental incomes (12). However, they possess relatively low levels of education, which may hinder their knowledge and ability to provide learning opportunities to their child at home (46, 47). Furthermore, Dai's study (48) found that to cope with the pressures of adapting to urban living and balancing work and family, landless farmers' families in urban villages adopted a three-generation childcare arrangement with grandparents being the primary caregiver for young children.

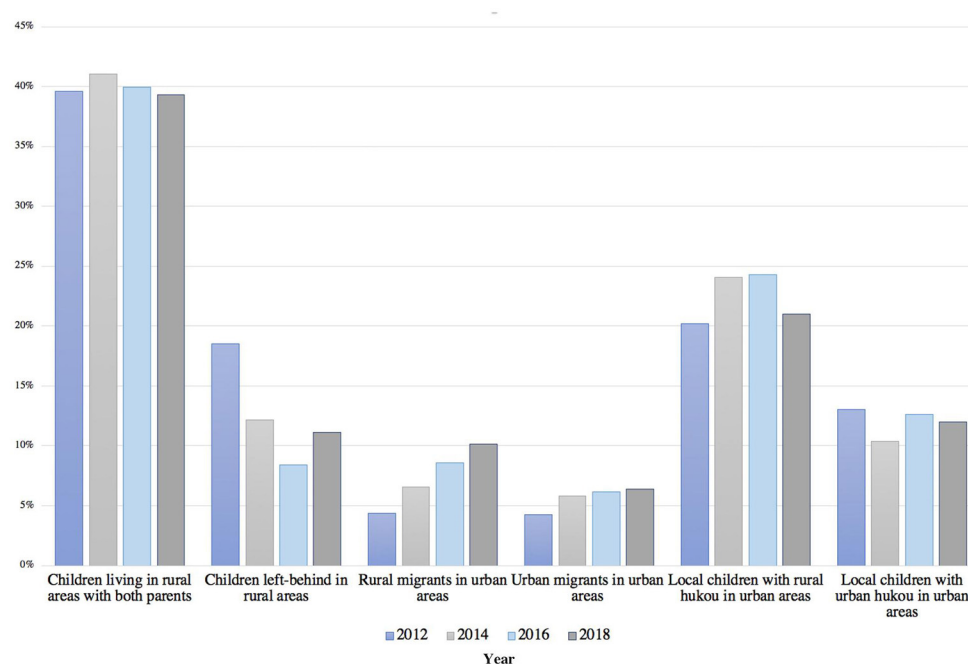


FIGURE 1
Living arrangements of 3- to 5-year-olds in China by year.

3.1. Parental absence and home learning environment

Parental absence is associated with less stimulating HLEs and may hinder children's development (49–51). According to the Chinese population census, the number of children not living with both parents in urban areas has increased from 3.10 million in 2000 to 28.26 million in 2015 (6). In previous studies, rural-origin migrant children and rural left-behind children have often been considered as two groups with different family migrant arrangements (52, 53). Evidence on the impact of parental absence on HLEs in China is mostly based on samples of rural children who have one or two migrant parents. Some children are left-behind with one parent, and others experience the absence of both parents. These studies have found that children living without both parents or with an absent mother receive relatively low levels of home-based stimulation (54, 55). However, children who migrated to cities may also experience parental absence. Only 45% of migrant children live with both parents, and 23.4% of migrant children live with non-family members (6). More research on the relation between parental absence and child development is needed so supportive policies and programs can be developed to promote family wellbeing.

4. Current study

Figure 1 presents information on the area of residence of participants, aged 3 to 5, in the different waves of the China Family Panel Studies (CFPS). According to the authors' calculations, the percentage of children left-behind in rural areas by their parents declined from 2012 to 2018, and more parents took their children along with them to the cities. This may be because there are no

suitable caregivers in the hometown and the perceived advantages of urban living. Additionally, the percentage of children residing in urban areas increased from 41.89% in 2012 to 49.56% in 2018. The percentage of children with urban *hukou* was 18.39% in 2018 and has remained stable over the years. The figures suggest that an increasing number of new urbanites and their children may experience challenges accessing public health, preschool education, and other publically funded social services in urban areas, which deserve further study. In this study, we aimed to extend previous research on urban-rural disparities to intra-urban disparities in early learning experiences in the context of urbanization, and four research questions (RQ) were addressed:

RQ1: Are there differences in the overall preschool attendance rate of rural-origin migrants, urban-origin migrants, rural-origin locals, and urban locals? Based on existing literature (4, 23), we hypothesize that the differences in the overall preschool attendance between rural-origin children and urban locals will not be significant.

RQ2: Are there differences in enrollment rates in public preschools among rural-origin migrants, urban-origin migrants, rural-origin locals, and urban locals? Given the *hukou* restriction and the unequal distribution of quality educational resources within urban areas, we hypothesized that a low portion of children with rural *hukou*, including rural-origin migrants and locals, would be enrolled in public preschools (23, 28). Furthermore, we hypothesized that holding a rural *hukou* will be associated with a lack to access to public preschool after controlling for family characteristics.

RQ3: Are there differences in home learning environments of rural-origin migrants, urban-origin migrants, rural-origin locals, and urban locals? As for home-based learning

experiences, we hypothesized that rural-origin migrant children would experience less stimulating HLEs than urban locals (42). Furthermore, although families of rural-origin local children may have higher income, their parental education level was comparable with rural-origin migrant families (46, 47), which may result in a lower frequency of learning stimulation for rural-origin locals compared to urban local children.

RQ4: Does parental absence affect children's HLEs in urban China? What are the relations among the child's *hukou* status, parental absence, and home learning environments in urban China? We hypothesized that the negative impact of parental absence on HLEs in urban areas is similar to evidence based on rural children (54, 55). There is little empirical evidence for us to propose a hypothesis on factors that mediate the relation between *hukou* and HLEs, so this question is exploratory. We examined whether *hukou* status was associated with parental absence and, in turn, HLEs.

5. Methods

5.1. Data and sample

This study leveraged an unbalanced panel dataset from the CFPS, a large-scale, nationally representative longitudinal survey in China conducted by the Institute of Social Science Survey of Peking University. The baseline survey of CFPS was implemented in 2010, adopting a stratified three-stage sampling strategy. Approximately 14,960 households in 635 communities across 25 provinces were selected through this approach, representing 95% of the Chinese population (56). The CFPS includes rural and urban samples and permits analyses pertinent to the research questions. In the CFPS, five questionnaires concern information at community, household, and individual levels. One eligible family member provided basic information of the whole family, such as relationships of family members and socio-demographic data. Family members over 16 years answered the adult questionnaires. The guardian provided information on children under 15 years by answering the proxy child questionnaire. Core family members from the baseline sample were followed up every 2 years. At the time of writing, complete data from five waves of CFPS data (2010, 2012, 2014, 2016, and 2018) and some data from 2020 had been released.

This study focuses on the early learning experiences of preschool-aged children in urban China. As the information on the type of preschool was not available for the 2010 wave, we pooled cross-sectional data from four waves of the CFPS (2012, 2014, 2016, and 2018). We restricted our sample to children aged 3–5 years, living in urban areas, and with registered *hukou* status. The CFPS project team followed the Census Bureau's classification of rural or urban regions to code the child's current residence. The final sample consisted of 2,446 participants, including 591 children in 2012, 622 children in 2014, 721 children in 2016, and 512 children in 2018.

5.2. Variables

We considered three outcomes related to children's early learning experiences in this study: preschool attendance, the type of preschool program attended, and HLEs. Caregivers indicated whether the child

was currently enrolled in a kindergarten or in a pre-primary class. Their responses were coded into a binary variable: 0 = no and 1 = yes. If the child was currently enrolled in a kindergarten or pre-primary class, a follow-up question was asked to identify the type of kindergarten or pre-primary class attended. The answer options were private and public. In the CFPS, a kindergarten or pre-primary class run by a private educational organization is considered private, regardless of whether it receives public assistance. Based on caregivers' responses on preschool enrollment status and the type of preschool, preschool experience was categorized into three categories (0 = not in school, 1 = private, and 2 = public).

The HLEs measure was constructed based on the caregiver's report of the frequency of four home learning activities: helping the child learn characters, reading to the child, taking the child out to play, and buying books for the child ($\alpha = 0.71$). Responses for each home learning activity were measured on a 5-point Likert scale (1 = several times a year or less, 2 = once a month, 3 = 2 to 3 times a month, 4 = several times a week, 5 = every day). The mean score of four items was calculated to represent the HLEs for young children.

A categorical independent variable of the child group was created based on the child's *hukou* (urban = 0, rural = 1) and migration status (locals = 0, migrants = 1). Parents were asked about the location of the child's place of household registration. Options for this question included: the child's *hukou* is in the same village or residential community, in another village or residential community in this township, in another township in this county/city/district, in another county/city/district in this province, or in another province in mainland China. If the location of the village or residential community in which the child lived were different from the current place of household registration, the child would be considered a migrant child. Otherwise, the child was deemed to be a local child. As noted previously, we categorized children into four distinct groups: rural-origin migrants (ROM), urban-origin migrants (UOM), rural-origin locals (ROL), and urban locals (UL). In data analysis, the child group variable was dummy coded with UL as the reference group.

Parental absence was coded based on whether the child lived without one or both parents for more than 7 months a year (0 = no, 1 = yes). This indicator was constructed based on two questions. Caregivers were asked to report how long the child lived with his/her father and mother in the past year on a scale of 1 to 7 (Almost the entire year, 11, 8–10, 5–7, 2–4 months, and 1 month, almost never). If the answers to both questions were more than five months, the child would be considered as not experiencing parental absence in the last year. In contrast, the child was considered left-behind if the child lived without one or both parents for more than seven months a year.

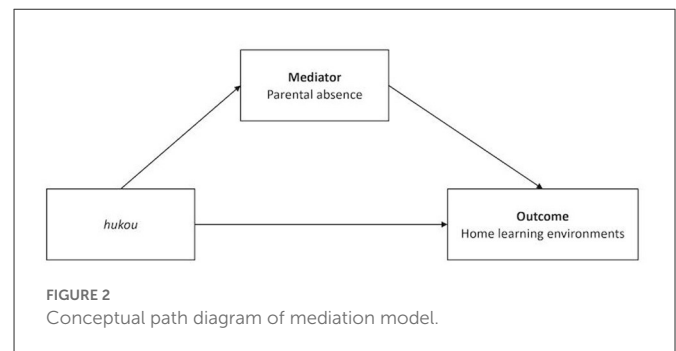
We also considered several demographic characteristics as control variables, such as child age, gender, ethnic minority status, family SES, and region of residence in China. Age was measured in completed months. A binary child gender variable was included where 0 denoted male and 1 denoted female. A binary variable of minority status was created where 0 denoted the child was Han Chinese and 1 denoted that the child was from an ethnic minority group. A composite of five variables was used to designate family SES: household wealth, paternal and maternal education levels, and paternal and maternal employment status. The annual net family income per capita (past year) in Chinese yuan was adjusted to be comparable with the year 2010 by the CFPS project team, and we used the log-transformed value for analyses. Paternal and maternal

education levels were determined by the highest level of education that the child's father/mother obtained, with higher scores showing a higher education level (1 = Illiterate/Semi-literate, 2 = Primary school, 3 = Junior High school, 4 = Senior High school, 5 = 3-year College, 6 = 4-year College, 7 = Master's degree or above). The data analyses treated paternal and maternal education levels as continuous variables. Paternal and maternal employment status were two coded as binary variables indicating whether the father or mother was employed at the time of the interview (0 = no, 1 = yes). The child's region of residence was determined from the caregiver report of the province in where the child lived. Provinces were classified into three categories representing the three economic regions in China (western China, central China, and eastern China). Three regions were recoded as two dummy variables, with western China being the reference group. In addition, we included a categorical variable of the time point of survey (2012, 2014, 2016, and 2018 waves) to control the differences across waves. Four waves were recoded as three dummy variables, with 2012 being the reference group.

5.3. Data analysis plan

Before answering the first research question, we describe trends in the types of preschool programs that children attend and HLEs in the four groups of children living in urban areas from 2012 to 2018. In addition, one-way ANOVAs or chi-square tests were applied to compare demographic characteristics and early learning experiences among the four groups of children. To answer RQ 1 to 3, we ran two regression models for each dependent variable before and after controlling covariates. The categorical independent variable of the four child groups was dummy coded with urban locals as the reference group. In the first model, we only included child characteristics and waves as control variables. In the second model, family characteristics were added as control variables. The overall preschool attendance was the dependent variable for RQ1. Binary logistic regression was used to examine the relation between the child group and preschool attendance. The type of preschool programs was the dependent variable for RQ2. Multinomial logistic regression was used to investigate the relation between the child group and the type of preschool program attended. HLEs was the dependent variable for RQ3. Ordinary Least Squares (OLS) linear regression was used for HLEs. To ensure that observations were independent in the analysis, we only used data from the most recent wave for children interviewed in multiple waves. We adopted multiple imputations by chained equation (MICE) to deal with the missing data (57). Missing data on covariates range from 0 to 13.97% on each variable. Missing data were imputed using MICE to create thirty imputed data sets. Continuous variables with missing data were imputed by predictive mean matching, and categorical variables with missing data were imputed using logistic models.

To answer RQ4, we examined the relation between parental absence and three outcomes of early learning experiences separately using regression analyses. Lastly, a path model was specified to test the mediating mechanisms from *hukou* to HLEs through parental absence (see Figure 2). Control variables for the mediation model included the child's age in months, gender, and waves of data collection. Based on Hu and Bentler's recommendations (58), several fit indices were used to evaluate the model fit. Acceptable model fits



were defined by a comparative fit index (CFI) ≥ 0.90 , standardized root mean residual (SRMR) ≤ 0.08 , and root mean square error of approximation (RMSEA) ≤ 0.08 . The 95% bootstrap confidence intervals estimates using the percentile method were used to test the significance of direct, indirect, and total effects in the path model. The effect can be supported if the 95% confidence interval of the 1,000 bootstrap estimates did not include zero. Missing data were handled by full information maximum likelihood estimation approach for the mediation analysis. All analyses in this study were conducted using Stata version 14 (StataCorp).

6. Results

6.1. Descriptive information on demographic characteristics and early learning experiences

The demographic characteristics of the overall and subgroup samples and the result of bivariate analyses are presented in Table 2. The sample consists of 374 ROM (15.29%), 289 UOM (11.82%), 1,161 ROL (47.47%), and 622 UL (25.43%). The average age of the sample was 51.43 months ($SD = 9.19$), and the percentage of girls was 47.02%. Child age and gender did not differ across the four groups. Overall, 7.83% of the sample were ethnic minorities. A higher percentage of ROL were ethnic minorities than other groups of children (10.71%; $\chi^2 = 26.88$, $p < 0.001$). As for family characteristics, there were significant differences among the four groups in family income, maternal and paternal education levels, and maternal and paternal employment status. ROL had the lowest household income and paternal and maternal level education among the four groups. The average paternal and maternal education levels for ROL were lower than junior high school. In addition, compared to other groups, a lower percentage of ROL's parents currently had a job. The household income and paternal and maternal education levels for ROM children were slightly higher than ROL but lower than the other two groups of urban-origin children. Fathers of ROM children reported the highest employment rate, while the employment rate of mothers of ROM was similar to ROL and lower than the two urban-origin groups. UOM were the most advantaged in family SES among the four groups, with the highest household income level and paternal and maternal education levels. Also, over 80% of mothers of UOM reported currently having a job, which was higher than ROL (65.71%) and ROM (66.67%). Furthermore, there was a difference in the region where children resided ($\chi^2 = 87.22$, $p < 0.001$). Specifically, a higher percentage of ROL (28.34%) lived in western China than ROM

TABLE 2 Sample characteristics and bivariate analyses.

		Overall sample		Urban locals		Rural-origin locals		Urban-origin migrants		Rural-origin migrants		χ^2/F (<i>df</i> = 3)	<i>p</i>
		Mean/%	SD	Mean/%	SD	Mean/%	SD	Mean/%	SD	Mean/%	SD		
Child age (months)		51.43	(9.19)	51.47	(9.13)	51.88	(9.19)	50.92	(9.13)	50.39	(9.26)	2.41	
Female		47.02		46.62		46.94		48.10		47.06		0.18	
Minority		7.83		4.84		10.71		4.20		6.68		26.88	***
Ln (annual income)		9.04	(1.53)	9.41	(1.35)	8.65	(1.50)	9.62	(1.54)	9.21	(1.56)	53.07	***
Paternal education		3.52	(1.37)	4.25	(1.37)	2.90	(1.06)	4.51	(1.42)	3.46	(1.17)	234.76	***
Maternal education		3.48	(1.35)	4.14	(1.36)	2.91	(1.05)	4.61	(1.35)	3.32	(1.12)	238.08	***
Paternal employment status		91.16		91.84		88.61		94.86		95.02		18.55	***
Maternal employment status		69.28		72.31		65.71		80.86		66.67		25.86	***
Place of residence	Western	22.36		13.83		28.34		18.69		20.86		87.22	***
	Central	29.84		31.67		32.39		22.49		24.60			
	Eastern	47.79		54.50		39.28		58.82		54.55			
Year	2012	24.16		29.58		24.55		20.76		16.58		37.32	***
	2014	25.43		22.19		27.56		26.64		23.26			
	2016	29.48		28.30		29.20		29.76		32.09			
	2018	20.93		19.94		18.69		22.84		28.07			
Preschool attendance		72.00		76.53		68.82		75.09		71.93		13.51	**
Type of preschool	No	30.27		25.57		33.49		27.91		29.75		43.67	***
	Private preschool	43.35		44.31		43.76		32.95		48.16			
	Public preschool	26.38		30.12		22.76		39.15		22.10			
HLEs		2.86	(0.95)	3.21	(0.81)	2.54	(0.97)	3.29	(0.78)	2.96	(0.89)	103.49	***
Reading		3.17	(1.44)	3.66	(1.31)	2.73	(1.44)	3.76	(1.21)	3.26	(1.39)	82.03	***
Learning characters		3.09	(1.40)	3.39	(1.29)	2.78	(1.42)	3.48	(1.27)	3.26	(1.38)	38.73	***
Outings		3.14	(1.30)	3.52	(1.10)	2.77	(1.37)	3.64	(1.03)	3.27	(1.21)	71.01	***
Buying books		2.05	(1.03)	2.26	(1.02)	1.87	(1.00)	2.29	(0.98)	2.05	(1.05)	25.60	***
Parental absence		19.92		13.37		25.47		12.50		19.30		49.16	***
N of Observation		2,446		622		1,161		289		374			

SD, Standard deviation. P-values are calculated with the chi-square (χ^2) or ANOVA tests depending on the type of variable. The asterisks are used to denote a statistically significant result in the chi-square or ANOVA tests, *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

(20.86%), UOM (18.69%), and UL (13.83%), and a lower proportion of them was in eastern China.

As shown in Table 2, the overall preschool attendance rate for the total sample was 72.00%, with ROL (68.82%) being slightly less likely to attend preschool than the other three groups. Approximately 26.38% of children in the total sample attended public preschool programs. The percentage of children accessing public preschool was lower for ROM (22.10%) and ROL (22.76%) than for UL (30.12%) and UOM (39.15%). The average score of HLEs for the total sample was 2.86 ($SD = 0.95$), indicating that urban parents provide learning stimulation to their children on a monthly basis. The score of HLEs was the lowest for ROL ($M = 2.54$, $SD = 0.97$) and followed by ROM ($M = 2.96$, $SD = 0.89$).

6.2. Trends in preschool experiences and HLEs

The percentages of attendance in different types of preschool programs for the four groups of children from 2012 to 2018 are presented in Figure 3. There was an overall increasing trend of preschool attendance and access to public preschools for all four groups of children, despite an unexpected increase of no preschool experiences in 2016. UOM had the highest rate of attendance in public preschools among all groups at all four time points, and the gap between rural-origin and urban-origin children in accessing public preschools persisted across the years.

Figure 4 shows the mean score of HLEs among four groups of children across waves. There was an increasing trend in

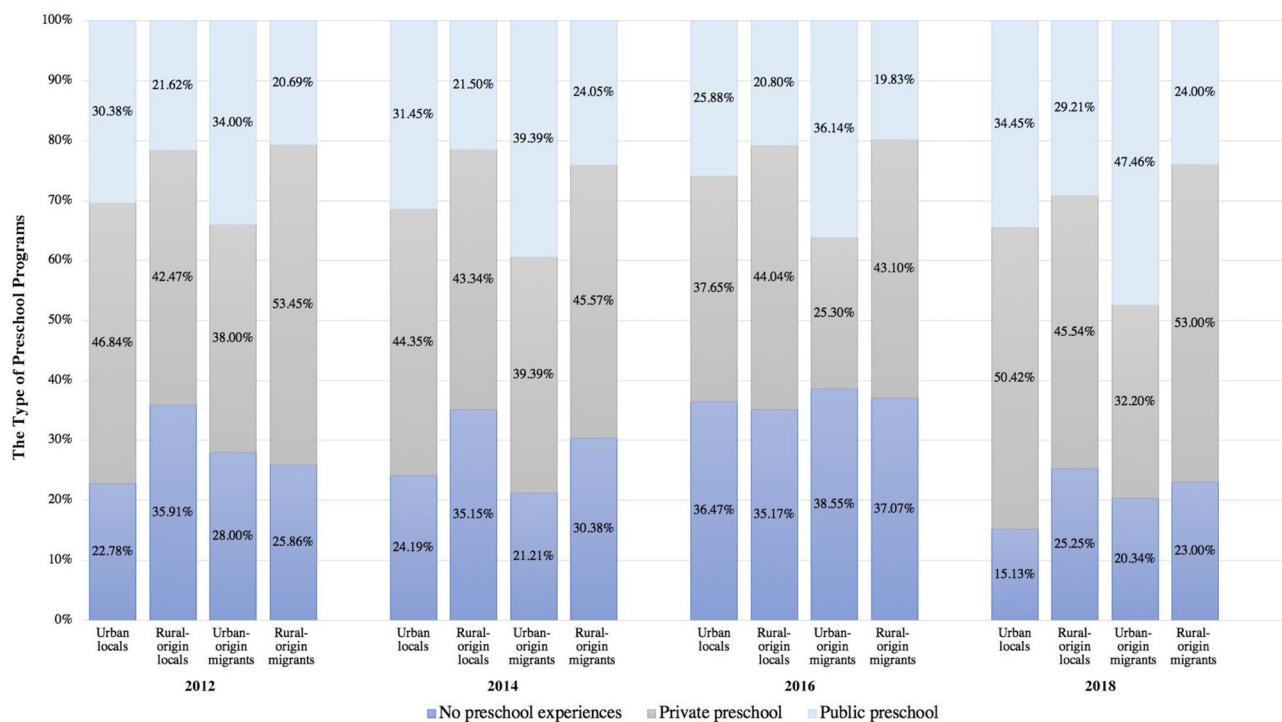


FIGURE 3
The type of preschool program urban children enrolled in by year.

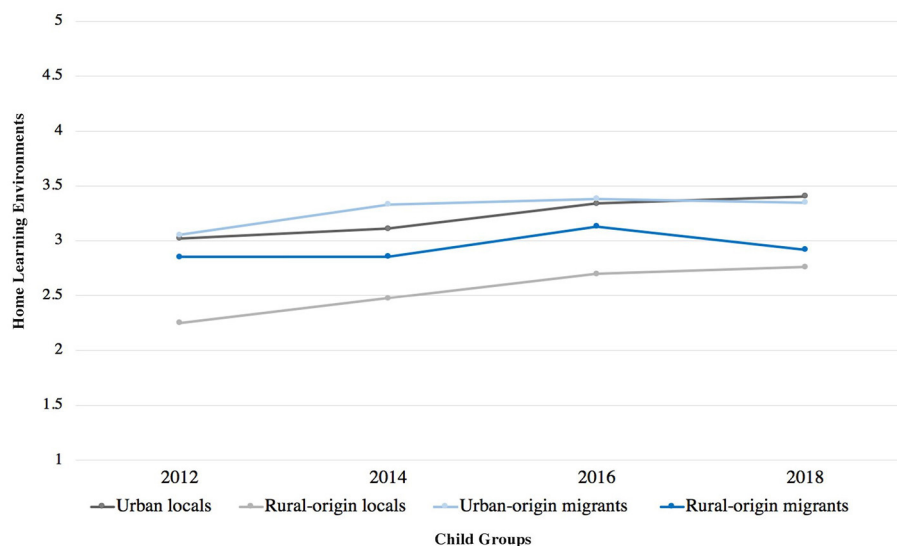


FIGURE 4
Home learning environments of urban children by year.

the frequency of HLEs for all groups of children except for a slight decrease from 2016 to 2018 for ROM. In 2018, ROM children ($M = 2.92$) and ROL ($M = 2.76$) experienced less frequent home learning stimulation compared to urban-origin children (UOM: $M = 3.35$; UL: $M = 3.41$), a gap evident over the years.

6.3. Results of regression analyses

6.3.1. RQ1: Differences in the overall preschool attendance across groups

Table 3 presents the result of regression analyses for preschool attendance and the type of preschool program attended. Controlling

TABLE 3 Regression models for preschool attendance and the type of preschool programs.

	Preschool attendance						The type of preschool programs											
	Model 1 (N = 1,876)			Model 2 (N = 1,876)			Model 3 (N = 1,876)						Model 4 (N = 1,876)					
	OR	SE	p	OR	SE	p	Private preschool			Public preschool			Private preschool			Public preschool		
							RRR	SE	p	RRR	SE	p	RRR	SE	p	RRR	SE	p
Child groups (ref: Urban locals)																		
Rural-origin locals	0.53	(0.09)	***	0.61	(0.12)	**	0.62	(0.11)	*	0.51	(0.10)	**	0.67	(0.14)		0.64	(0.15)	*
Urban-origin migrants	1.04	(0.26)		1.12	(0.29)		0.84	(0.22)		1.50	(0.40)		0.92	(0.25)		1.54	(0.42)	
Rural-origin migrants	0.73	(0.16)		0.83	(0.19)		0.90	(0.20)		0.60	(0.15)	*	0.99	(0.24)		0.70	(0.19)	
Child age (months)	1.15	(0.01)	***	1.15	(0.01)	***	1.14	(0.01)	***	1.17	(0.01)	***	1.14	(0.01)	***	1.18	(0.01)	***
Female (ref: Male)	0.83	(0.11)		0.87	(0.12)		0.86	(0.12)		0.80	(0.13)		0.91	(0.14)		0.84	(0.14)	
Year (ref: 2012)																		
2014	0.87	(0.18)		0.87	(0.20)		0.87	(0.19)		0.94	(0.23)		0.89	(0.21)		0.93	(0.24)	
2016	0.68	(0.14)		0.62	(0.13)	*	0.75	(0.16)		0.80	(0.19)		0.72	(0.17)		0.72	(0.18)	
2018	0.99	(0.20)		0.86	(0.19)		1.00	(0.22)		1.18	(0.28)		0.92	(0.22)		0.97	(0.26)	
Parental absence				0.77	(0.13)								0.72	(0.13)		0.82	(0.16)	
Minority (ref: Han)				0.40	(0.09)	***							0.34	(0.09)	***	0.47	(0.13)	**
Ln (annual income)				0.95	(0.05)								0.96	(0.05)		0.96	(0.05)	
Paternal education				0.95	(0.07)								0.92	(0.07)		1.05	(0.09)	
Maternal education				1.13	(0.09)								1.10	(0.09)		1.10	(0.10)	
Paternal employment status				1.27	(0.37)								1.17	(0.34)		1.24	(0.40)	
Maternal employment status				1.37	(0.22)	*							1.35	(0.22)		1.37	(0.25)	
Place of residence (ref: Western)																		
Central				2.35	(0.50)	***							2.51	(0.55)	***	1.69	(0.40)	*
Eastern				0.88	(0.15)								0.82	(0.16)		0.83	(0.17)	
Constant	0.01	(0.00)		0.00	(0.00)		0.01	(0.00)		0.00	(0.00)		0.01	(0.00)		0.00	(0.00)	

OR, Odds ratio; RRR, Relative risk ratio; SE, Standard error; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

TABLE 4 Regression models for home learning environments.

	Home learning environments							
	Model 5 (N = 1,847)				Model 6 (N = 1,847)			
	B	SE	ES	p	B	SE	ES	p
Child groups (ref: Urban locals)								
Rural-origin locals	−0.67	(0.05)	−0.35	***	−0.30	(0.05)	−0.16	***
Urban-origin migrants	0.04	(0.07)	0.01		−0.05	(0.07)	−0.02	
Rural-origin migrants	−0.34	(0.07)	−0.13	***	−0.12	(0.06)	−0.05	
Child age (months)	−0.01	(0.00)	−0.08	***	−0.01	(0.00)	−0.06	**
Female (ref: Male)	0.00	(0.04)	0.00		0.00	(0.04)	0.00	
Year (ref: 2012)								
2014	0.18	(0.06)	0.08	**	0.14	(0.06)	0.06	*
2016	0.43	(0.06)	0.20	***	0.28	(0.06)	0.13	***
2018	0.41	(0.06)	0.19	***	0.19	(0.06)	0.09	**
Parental absence					−0.15	(0.05)	−0.06	**
Minority (ref: Han)					−0.12	(0.08)	−0.03	
Ln (annual income)					0.03	(0.01)	0.05	*
Paternal education					0.10	(0.02)	0.14	***
Maternal education					0.15	(0.02)	0.22	***
Paternal employment status					0.24	(0.08)	0.07	**
Maternal employment status					−0.10	(0.05)	−0.05	*
Place of residence (ref: Western)								
Central					−0.08	(0.06)	−0.04	
Eastern					−0.02	(0.05)	−0.01	
Constant	3.46	(0.15)			2.02	(0.20)		
R-square	0.15				0.25			
Adjusted R-square	0.15				0.25			

B, Coefficient estimates; SE, Standard error; ES, Effect size; *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$.

for child age, gender, and waves, the preschool attendance rate for ROL was significantly lower than UL (Model 1; $OR = 0.53$, $SE = 0.09$, $p < 0.001$), and there was no difference in preschool attendance between ROM and UL. After adding family characteristics as control variables, ROL remained less likely to attend preschool compared to UL (Model 2; $OR = 0.61$, $SE = 0.12$, $p < 0.01$).

6.3.2. RQ2: Differences in access to public preschools across groups

In Model 3, ROM was less likely to access public preschool than UL controlling for child age, gender, and waves ($RRR = 0.60$, $SE = 0.15$, $p < 0.05$). The likelihood of accessing private preschool and public preschool for ROL was significantly lower than UL (Private preschool: $RRR = 0.62$, $SE = 0.11$, $p < 0.05$; Public preschool: $RRR = 0.51$, $SE = 0.10$, $p < 0.01$). After adding family characteristics as control variables, there was no statistically significant difference in the type of preschool programs between ROM and UL. However, ROL remained less likely to access public preschools than UL (Model 4; $RRR = 0.64$, $SE = 0.15$, $p < 0.05$).

6.3.3. RQ3: Differences in HLEs across groups

Table 4 presents the result of regression analyses for HLEs. ROM and ROL experienced a lower frequency of home learning activities than UL controlling for child age, gender and wave (Model 5; ROM: $B = -0.34$, $SE = 0.07$, $ES = -0.13$, $p < 0.001$; ROL: $B = -0.67$, $SE = 0.05$, $ES = -0.35$, $p < 0.001$). After adding family characteristics as control variables, ROM no longer displayed a statistical disadvantage in HLEs compared to UL. However, being a ROL was associated with experiencing less stimulating HLEs (Model 6; $B = -0.30$, $SE = 0.05$, $ES = -0.16$, $p < 0.001$).

6.3.4. RQ4: The relation between hukou, parental absence and HLEs

Table 2 shows the percentage of urban children in the four sub-groups who experienced parental absence. The percentage of experiencing the absence of one or both parents was the highest in the ROL group (25.47%), followed by ROM (19.30%). UOL (13.37%) and UOM (12.50%) were less likely to experience parental absence compared to children with rural hukou in urban areas. The result of

TABLE 5 Estimates of the mediation analysis.

	β	B	SE	CI lower	CI upper	
Direct path						
<i>Hukou</i> → Parental absence	0.151	0.123	0.019	0.086	0.159	
Parental absence → HLEs	−0.077	−0.186	0.052	−0.288	−0.083	
<i>Hukou</i> → HLEs	−0.293	−0.571	0.043	−0.655	−0.487	
The Effect from <i>hukou</i> to HLEs						
The indirect effect of <i>hukou</i> on HLEs	−0.012	−0.023	0.008	−0.040	−0.008	
The total effect of <i>hukou</i> on HLEs	−0.305	−0.594	0.041	−0.666	−0.506	
Model fit	χ^2	<i>df</i>	<i>p</i>	<i>CFI</i>	<i>RMSEA</i>	<i>SRMR</i>
	10.243	3	0.017	0.975	0.038 (0.014–0.064)	0.016
N of Observation	1,876					

Bolded results are significant at 0.05 level. Covariates included child age in months, gender and waves.

the chi-square difference test showed that significant between-group differences in experiencing parental absence ($\chi^2 = 49.16, p < 0.001$).

In our sample, 46.30% of children experiencing parental absence were mainly looked after by their grandparents, while 18.88% of children with neither parent absent were looked after by grandparents. As the education level of grandparents tends to be lower than parents, grandparents sometimes lack knowledge of appropriate parenting practices (59), which may limit the amount of learning stimulation at home and hinder child development.

The results from the regression analyses of the relation between parental absence and three outcomes of early learning experiences are presented in Tables 3, 4. After adjusting for all covariates, urban children who experienced parental absence were less likely to have frequent home learning stimulation (Model 6; $B = -0.15$, $SE = 0.05$, $ES = -0.06$, $p < 0.01$) than other children. There was no significant relation between parental absence and children's preschool attendance and accessing public preschool programs.

The mediation analysis was performed to explore whether the *hukou*-based differences in HLEs were explained by parental absence, controlling for child age, gender and waves. Table 5 presents the model fit and direct and indirect effect estimates of the mediation model. Based on the fit index, the path model fit the data well. The indirect effect of the child's *hukou* status on HLEs mediated via parental absence was significant ($\beta = -0.012$, $B = -0.023$, $SE = 0.008$, 95% CI $[-0.040, -0.008]$), indicating parental absence explained the variation in HLEs by child *hukou* status. Having rural *hukou* increases the risk of experiencing parental absence ($\beta = 0.151$, $B = 0.123$, $SE = 0.019$, 95% CI $[0.086, 0.159]$), which in turn, decreases the frequency of home learning activities ($\beta = -0.077$, $B = -0.186$, $SE = 0.052$, 95% CI $[-0.288, -0.083]$). The direct effect of *hukou* on HLEs was also significant ($\beta = -0.293$, $B = -0.571$, $SE = 0.043$, 95% CI $[-0.655, -0.487]$). The ratio between the indirect effect and the total effect suggested that 3.80% of the disparity in HLEs between children with rural and urban *hukou* was mediated via parental absence.

7. Discussion

Notwithstanding the declining birth rate in China, internal migration and urban expansion have led to an increasing number

of preschool-aged children in urban areas. Institutional barriers such as the *hukou* system may lead to unequal access to educational and other resources in urban areas for young migrants. Quality early learning experiences lay the foundation for child development and school success (16, 17). This paper considers disparities in early learning experiences in urban areas in a rapidly urbanizing China. We leveraged nationally representative data from the CFPS (2012–2018) and identified four groups of children in urban China based on their *hukou* and migrant status: rural-origin migrants (ROM), rural-origin locals (ROL), urban-origin migrants (UOM), and urban locals (UL). Taken together, analyses to answer the four research questions indicated that there were disparities in preschool experiences and HLEs between rural-origin and urban-origin children in urban China and that these disparities persisted over time. Having a rural *hukou* was associated with less favorable early learning experiences. Furthermore, rural-origin children in cities experience parental absence, which, in turn, may reduce their HLEs. The disparities in early learning experiences in urban China are complex. This study contributes to a more nuanced understanding of the demographic characteristics and early learning experiences of different child groups in urban China and highlights areas for future research.

Although family SES differences across different groups of urban children are not the focus of our study, it is worth noting that the family income for ROL was the lowest among the four groups of urban children. Evidence from qualitative studies indicated that locals in urban villages are relatively wealthier than rural families as they often have stable rental incomes (12, 46). However, compared with urban families, they tend to be a disadvantaged group. UOM tend to be a more advantaged group in terms of family SES and early learning experiences. For example, parents who move from Beijing to Shanghai may be highly educated. Our study contributes to a deeper understanding of the family characteristics of different sub-groups of urban children.

This study found that all four groups of children generally received more stimulating early learning experiences with time. This finding is consistent with earlier evidence (22, 24, 33), and showcases the effectiveness of increased investment in ECE by the national government since 2010. However, barriers to migrants' access to public preschools remain. Su and Rao (33) argued that along with the overall increased family wealth and parental educational level in China, the child's HLEs improved. This pattern was observed

for UOM, ROL, and UL, but the score of HLEs for ROM tended to flatten from 2012 to 2018. Since the implementation of the National New Urbanization Plan (2014–2020), the government has developed medium-sized cities and gradually lifted *hukou* restrictions with the goal of making it easier for migrants to settle in cities. However, an improvement in rural-origin migrant children's access to quality education and HLEs is not apparent, which indicates the need for child- and family-friendly policies for migrant workers with preschool-aged children in urban areas.

We found no significant differences in overall preschool attendance rates between ROM and UL but ROM were less likely than UL to access public preschool programs. It should be noted that the likelihood of ROL accessing preschool and public preschool programs was lower than UL after controlling for family characteristics. As discussed in previous qualitative research, there is a shortage of educational resources, especially quality preschool education in urbanizing villages (23). As noted earlier, ROM and ROL tend to live in urban villages, and there are barriers to enrolment in public preschools beyond *hukou* and family SES.

Furthermore, ROM and ROL received less stimulating learning experiences at home than UL. However, after controlling for their family characteristics, the HLEs for ROM and UL were similar. In our sample, parental educational levels of ROM were lower than UL, which may explain the variations in HLEs. At the same time, previous studies found that migrant parents hold as high expectations for their children as urban local parents. However, financial stress and unstable living and work environments might indirectly hinder parents from providing a nurturing and stimulating environment for their children (42, 60). Moreover, the finding showed that the differences in HLEs between ROL and UL remain even after controlling family SES, which indicates that different factors may influence HLEs in ROM and ROL. Motivation may be one possible explanation for this finding, as past studies have highlighted that migrating to cities is a family choice; migrants typically have a strong motivation for upward social mobility (12, 61). In contrast, ROL live in urban villages because of the expanding urban areas and may never leave their home villages (48). Further studies can provide a more nuanced understanding of the HLEs of ROL.

Caregivers of rural-origin children leave their home towns to seek better employment opportunities in urban areas. Consistent with previous research (54, 55), we found that parental absence is negatively associated with HLEs, regardless of whether children reside in urban or rural areas. Mediation analyses suggested that the relation between *hukou* status and the home learning environment was mediated by parental absence. Therefore, policy attention should be given to children with rural *hukou* in cities and those from less developed urban areas.

7.1. Implications

The findings of this study have implications for evidence-based early childhood policies and programs. First, data on enrolment in public preschools in cities should be disaggregated by *hukou* and migration status. The percentage of migrant children enrolled in compulsory education has been identified as a key indicator for tracking China's urbanization process in the 2014–2020 New Type Urbanization Plan (62). Data on the preschool enrollment rate for

rural-origin migrant and local children should also be collected and monitored by the government regularly to index educational equity. Second, the Chinese government has prioritized preschool quality, and vulnerable children should have equitable access to high quality preschool programs. Increased effort should be exerted to ensure that preschools in urban villages are accessible and affordable to parents and that preschools provide high quality education. Effective social protection policies and practices, such as the conditional cash transfer programs in Brazil, have improved school attendance rates and school readiness for poor children in urban areas (3). Conditional cash transfer programs have been used in the Chinese context and their effectiveness in promoting preschool attendance may be explored (58, 63). Third, more support should be provided to vulnerable children from economically disadvantaged families. We found that family SES explained differences in early learning experiences between rural-origin children and urban locals. Therefore, policy and programs should not only target reducing institutional barriers for migrants but also include low-SES families. Fourth, more policy attention should be given to families in urban villages, as we found that children in urban villages experienced the least stimulating HLEs of all child groups. Parents in urban villages continue to be highly influenced by traditional Chinese parenting beliefs and practices (46, 47) which may be more relevant to those living in rural areas. Schools and communities can collaborate and support the acculturation of underprivileged families in urban villages by providing them with information on age-appropriate child development and parenting practices. Fifth, given that a considerable number of children living in urban areas experience parental absence for over 6 months, support and education should be provided to caregivers, especially grandparents, in some urban villages. In short, within the Chinese context, it is important to provide tailored support for children based on their *hukou*, migration status, SES background, and place of residence.

7.2. Limitations and further research

Despite its contributions, our study has a few limitations. First, information about early learning experiences, be it HLEs or preschool experience, were reported by caregivers leading to common method bias. Second, the CFPS only measured the frequency of parental involvement in home learning activities. We have no information about the quality of the interactions. Third, we base our conclusions on the quality of preschools on the existing literature, which indicates that public preschools are of higher quality than private preschools. We did not measure preschool quality. Fourth, the cross-sectional nature of this study prohibits causal conclusions from the observed associations. Longitudinal data collected *via* direct assessment of preschool-aged children's home and center-based learning experiences are necessary.

Further research should provide a nuanced understanding of the reasons for disparities in early learning experiences between different groups of children. We found that institutional barriers affected children's early learning experiences. However, *hukou* restrictions vary across cities in China. Future studies can examine the association between the migrant destination and children's early learning experiences. Additional research

can shed light on the experiences of children in urban villages and how it is affected by contextual characteristics such as the number of kindergartens and density of the migrant population.

8. Conclusions

This study highlighted the gaps in early learning experiences among rural-origin migrants, urban-origin migrants, rural-origin locals, and urban locals. Institutional and social barriers have precluded children with rural *hukou* in urban China from receiving quality preschool experiences and stimulating home learning activities. In addition, parental absence was associated with disparities in preschool-aged children's home learning experiences in cities. Our findings have implications for developing and implementing evidence-based policies and programs to promote educational equity. Rural-origin children, children from economically disadvantaged backgrounds, and those who experience parental absence have poorer early learning environments than their peers and require policy support. On a broader scale, our findings may apply to other developing countries experiencing rapid urbanization and that have large numbers of young migrant children. With sustainable urban planning and policy interventions, more families and children can enjoy the benefits of urbanization.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found here: The datasets China Family Panel Studies (CFPS) for this study can be found in the Peking University Open Research Data Platform <https://doi.org/10.18170/DVN/45LCSO>.

Ethics statement

The studies involving human participants were reviewed and approved by the Peking University Biomedical Ethics Review Committee. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

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Author contributions

JG and NR conceptualized and designed the study. JG performed the analyses and wrote the first draft with the support of NR. All authors critically reviewed this draft and approved the final draft for submission.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The role of fathers and care-giving arrangements in informal settlements in Kenya and Ethiopia

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Introduction: Quality childcare has been associated with multiple long-term benefits for children including improved school readiness, better educational outcomes and improved health and productivity. Evidence suggests that returns on investment are much higher when targeted at the youngest children, especially during the first 1,000 days. Despite the evidence and the ever-increasing need and potential benefits, investments made so far to make high-quality childcare accessible to the neediest families are not commensurate. It is estimated that nearly 350 million eligible pre-primary school-age children have no access to quality childcare, especially in low-and middle-income countries. The purpose of this study was to establish the role of fathers and the childcare arrangements in selected urban informal settlements in Kenya and Ethiopia.

Methods: A mixed methods design was adopted with quantitative data being collected using a structured household questionnaire administered to 635 mothers of children of 0–3 years from both countries. In both countries, data was collected from three vulnerable communities namely urban informal settlements, large commercial agricultural settlements associated with flower farms, and female penal institutions where women with young children below 4 years old are incarcerated. Quantitative data was not collected from the penal institutions because during the time of the study (at the height of the Covid-19 pandemic), access to members of the public including researchers was restricted and so here only qualitative data was collected. The data reported in this article therefore does not include data from penal institutions.

Results: Findings show that fathers played a major role in childcare according to 74% of respondents in Kenya and 57.7% in Ethiopia. This involvement is mainly defined in terms of providing financial support for basic needs for the family and child and for accessing health care. Some fathers were found to be either minimally involved or not involved at all. Key reasons advanced for minimal engagement included fathers having either left home permanently, had another family, was working far from home or was working long hours. Findings regarding care arrangements established that significant proportions of children had been left behind without adult supervision. Neighbors and siblings younger than 18 years provided most of the alternative care. House helps also accounted for 20.3% of care in Ethiopia with none being registered for Kenya. Daycare services only accounted for 13.4% of care in Kenya and 6.3% in Ethiopia, respectively.

Conclusion: The findings revealed that fathers are fairly involved in childcare even mainly through providing necessary resources. Significantly high proportions of children were left under the care of their underage siblings leading to questions of the safety of these children. Parents and guardians in these settlements had access to a mix of care arrangements including both unpaid and paid neighbors, toddler's siblings and in limited cases, daycare services. The low levels of utilization

of daycare services indicate either limited services or inability to pay for the same. It is recommended that governments consider investing in childcare services in informal settlements.

KEYWORDS

childcare, Kenya, Ethiopia, father involvement, childcare arrangements, caregiving

Introduction

Early childhood is a crucial period that requires due attention and a great deal of investment; it sets the foundation for life and has enormous impact on children's readiness for primary school (1). Various research outputs underlined that if children are not given timely and adequate opportunities for good nutrition and adequate stimulation, they lose opportunities for good physical and intellectual growth that may not be easily compensated at any other stage in their life course. These impacts last long into adulthood and impact on the health, behaviors and learning abilities of children as adults. According to UNESCO (2), failing to provide children with better nutrition, health care and education, at this stage of development, deprives them of their right to develop as productive citizens, enjoy a better life and eventually contributes to society's growth.

It has also been emphasized that the returns on investment in ECD are substantial (3). Hence, the combined attainments in health, nutritional, educational and social development during early childhood do not only generate benefits to individual children and families but it also saves public money through better school achievements that reduce wastage in education, greater income and taxes from skilled and economically productive individuals, healthy and responsible citizenship that reduces costs of ill health, anti-social behaviors and social inequities. ECD is, therefore, the most effective and cost-efficient time to ensure that all children develop to their full potential (4).

Samman et al. (5) assert that due to the changing relationship of women with regard to their engagement with the labor market, women in recent decades are forced to seek external support for childcare. One of these supports should naturally come from the fathers who are essential part of the child's world. Studies reveal a specialized gender division of labour between men and women whereby men play a more instrumental role which includes providing money for basic needs, such as food and other necessities. They also support money to access health care services. Female caregivers including mothers on the other hand, play a mostly nurturing role that include stimulating, soothing, feeding, bathing and playing with the child (6–9). Father involvement has been found to encounter some barriers such as being engaged away at work, traditional gender roles that assign caregiving to females, lack of willingness on the part of fathers and lack of caregiving skills (9).

The current study tries to establish the role of fathers in childcare and the childcare arrangements available to parents of young children in selected urban informal settlements in Nairobi, Kenya and Addis Ababa, Ethiopia. For the purpose of this study, two vulnerable communities in informal settlements were selected from each country, namely, *Shiromeda* (an informal urban settlement in Addis Ababa) and *Batu/Zeway* (a rural commercial agricultural community) from Ethiopia and *Naivasha* and *Kawangware* in Nairobi, Kenya.

The study adopted a cross-sectional mixed methods research design that involves the collection of both quantitative and qualitative data. For the quantitative phase of the study, a questionnaire was developed to serve as the data-collection instrument which was used to interview the participants. The instruments developed for collecting qualitative data were structured interviews, FDG and observation guidelines. The questionnaires were administered to a total of 635 mothers or caregivers of children of 0–3 years of age from both countries.

Materials and methods

For this study, a concurrent parallel mixed methods research design was adopted. In this design, both quantitative and qualitative data are collected and analyzed simultaneously. Thereafter, the findings are compared to determine whether they complement or contradict each other (10). A mixed methods design was preferred because through it, the quantitative and qualitative methodologies complement, mutually reinforce, and offset the biases inherent in each. More specifically, combining the two facilitated the generation of broader and deeper insights about the status of childcare in Kenya and Ethiopia (10).

The study was guided by a dual peer review process involving a research technical team and a research advisory team (RAT). The research technical team consisted of research experts and was responsible for the development of an appropriate research design, data collection, analysis, report writing and dissemination. The research advisory team comprised key members of the ECD ecosystem in each country with the mandate to advise the technical team on scientific rigour, engagement with the communities, local authorities, and national government. The RAT was updated on the progress being made in the study.

Study site and scope

This was a dual-country study conducted in Kenya and Ethiopia and targeted mothers of children of ages 0–3 years living in vulnerable communities. Three specific types of vulnerable communities for this study were urban informal settlements, large commercial agricultural settlements associated with flower farms, and female penal institutions. These female penal institutions hold women who are accompanied with their young children. In Kenya for instance, the Prisons Act provides that if alternative care arrangements are not available, women who are sentenced to serve a prison sentence may bring their young children provided they are below 4 years of age. We purposively selected one community to represent each of these special categories. The selected sites are presented in Table 1.

Study population and sample size

The main population for this study was mothers of children aged 0–3 years from informal settlements, large scale commercial agricultural communities and female penal institutions. Other populations interviewed included daycare centre owners, community health workers, volunteer children's officers, prisons officials, civil society organisation personnel engaged in childcare, government officials in agencies and departments dealing with early childhood and flower farm representatives. The distribution of sample size by country and type of data collection method is presented in [Table 2](#).

Methods and procedures of data collection

Data was collected through four methods and took place between February and May 2020 in Ethiopia and between August 2020 to March 2021 in Kenya. During the period of the study, institutionalized daycare centres in Kenya and Ethiopia had been closed due to the Covid-19 pandemic leading to an upsurge in homebased daycares. The entire process for carrying out the study was similar in both countries with involvement of key stakeholders including key government ministries of interior, education, health and social services, civil society organizations, faith-based leaders and other actors from each country based on the selection of three settlements. Data reported for this study is that derived from the household questionnaire which was not administered in penal institutions where only semi-structured interviews were conducted. Given that in data fathers do not have unrestricted access to their incarcerated wives and the children who accompany their mothers to prison, their role is only limited to open days when they can visit these facilities. Otherwise, the fathers have no regular contact with the children.

Quantitative data was collected using structured household questionnaires which was administered with the help of trained and experienced research assistants. The questionnaires were digitally administered in Kenya by use of the Open Data Toolkit (ODK) by use of handheld digital devices. In Ethiopia, administration was through

paper-based questionnaires due to problems with access to reliable electricity and internet in the areas of the study. The qualitative data was collected through focus group discussions (FGDs) and semi-structured interviews. FGDs were held with mothers of 0–3 years, community health workers, and daycare operators. Each FGD comprised of between 6–8 participants and lasted an average of one-and-a-half hours. A total of 16 FGDs were conducted across the two countries (4 in Ethiopia and 12 in Kenya). The groups were homogeneous to avoid the disruptive nature of probable conflict of ideas that may arise if heterogeneous groups were used [homogeneity was attained by having groups comprised of one gender and of people who had similar experiences such as being parents of children 0–3 years (11)]. In this study, role of fathers was defined to mean whether they played a major, minor or no role. For cases where fathers played a minor or no role, the study proceeded to establish the reason as to why they played a minor role. Additionally, the study sought to establish the level of financial support of the father whether he catered for 100, 75, 50, 25% or 0%.

Semi-structured interviews [$n=85$ (36 in Ethiopia and 49 in Kenya)] were conducted with key informants including government officials, prisons officers, civil society personnel and representatives of flower farms from the two countries. Other participants in the interviews included mothers of 0–3-year-old children, daycare owners, community health volunteers (CHVs), volunteer children's officers, and local government officials. The intention of these interviews was to capture detailed information from personal experiences of mothers and from frontline workers and administrators which could not have been captured by use of the structured household questionnaires. We adopted multiple methods of data collection to generate a robust triangulated account of childcare in these areas.

Quality of services in home-based daycare centres was assessed using an adapted version of the Revised Infant Toddler Environment Rating Scale (ITERS-R). "ITERS-R is designed to assess center-based childcare programs for infants and toddlers up to 30 months of age. The Scale consists of 39 items organized into 7 subscales: space and furnishings, personal care routines, listening and talking, activities, interaction, program structure, and parents and staff" (12).

This tool was used to assess the physical environment, personal care routines, listening and talking, activities to support child development, interactions, programme structure, provisions for parents and key issues related to the staff. The rating was done for home-based daycare centres that were operating at the time of the study and in each facility, we had a team of two well-trained research assistants who did their ratings independently and were overseen by a qualified expert in conducting quality assessments. A total of 17 daycare centres were observed in Kenya. This assessment was not done in Ethiopia as these types of facilities were either lacking in the area or were closed due to COVID-19-related lockdown.

TABLE 1

Study site	Ethiopia	Kenya
Large commercial agricultural settlements	Zeeway flower farms	Naivasha flower farms
Urban informal settlements	Shiromeda area	Dagoretti north (Kawangware)
Women's Prison community	Kaliti central correction Centre	Langata women's prison

TABLE 2

Method of data collection	Ethiopia	Kenya	Total
Questionnaire	311	324	635
Semi-structured interviews	36	49	85
Focus group discussions	4	12	16
ITERS	0	17	17

Data processing and analysis

Quantitative data was converted to SPSS files from ODK to facilitate descriptive and inferential analysis. Basic descriptive statistics such as percentages, frequencies, and means were generated to present demographic data. The data is presented in form of graphs, charts and tables. The qualitative data, mainly collected in audio form was transcribed into text, imported to MAXQDA data analysis software,

and thematically coded and analysed based on the objectives of the study. Qualitative data is presented in the form of thematic syntheses and verbatim quotations.

For the ITERs, rating of all the scores in the two counties was done during the observation by the research assistants (RAs) before leaving the daycare centres as per the recommendations from the tool. The hard copies of the responses were later typed into an excel file. The principal investigator went through the data to ensure they were complete. The ITERs assessment data was analysed descriptively (frequencies, means and medians) to describe the data from the quality assessment tool.

Results

The role and involvement of a father in childcare

In this regard, the study was interested in establishing the level of involvement of fathers in childcare. In this section, we shall examine the role of father in terms of whether they perform a major, minor or no role in childcare and the reasons why the father plays a minor or no role. We shall also assess the level of financial support from the fathers, and frequency of fathers' engagement in childcare activities. Financial support of the father was seen as critical because given the nature of fathers occupations, they may sometimes not be staying together most of the time with their families but maybe far away at work. Even when they stay with the family, they may be leaving home early and arriving late. This means the other way they may contribute is in material terms and not necessarily in nurturance.

In order to examine the role and contribution of a father in child rearing, respondents were asked whether the father plays a major role, a minor role, or plays no role in childcare. With major, minor or minimal role, what is meant is the intensity of the engagement with the support to child upbringing. Major role was taken to mean that they provide the financial resources on a regular basis to their families and are dutifully performing this role. The question was posited to

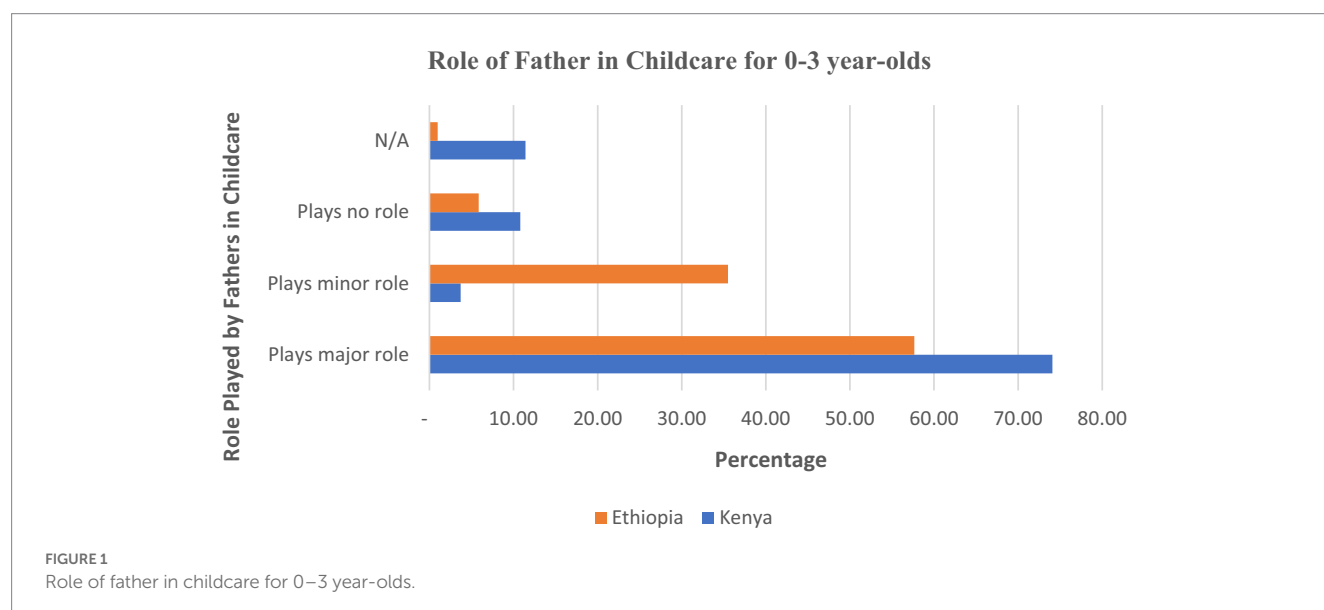
find out the level of involvement of a father in upbringing of a child, if not involved, the reasons for not being involved, the financial contribution of the father and the time the father spends with the child. [Figure 1](#) summarizes the involvement of fathers in childcare.

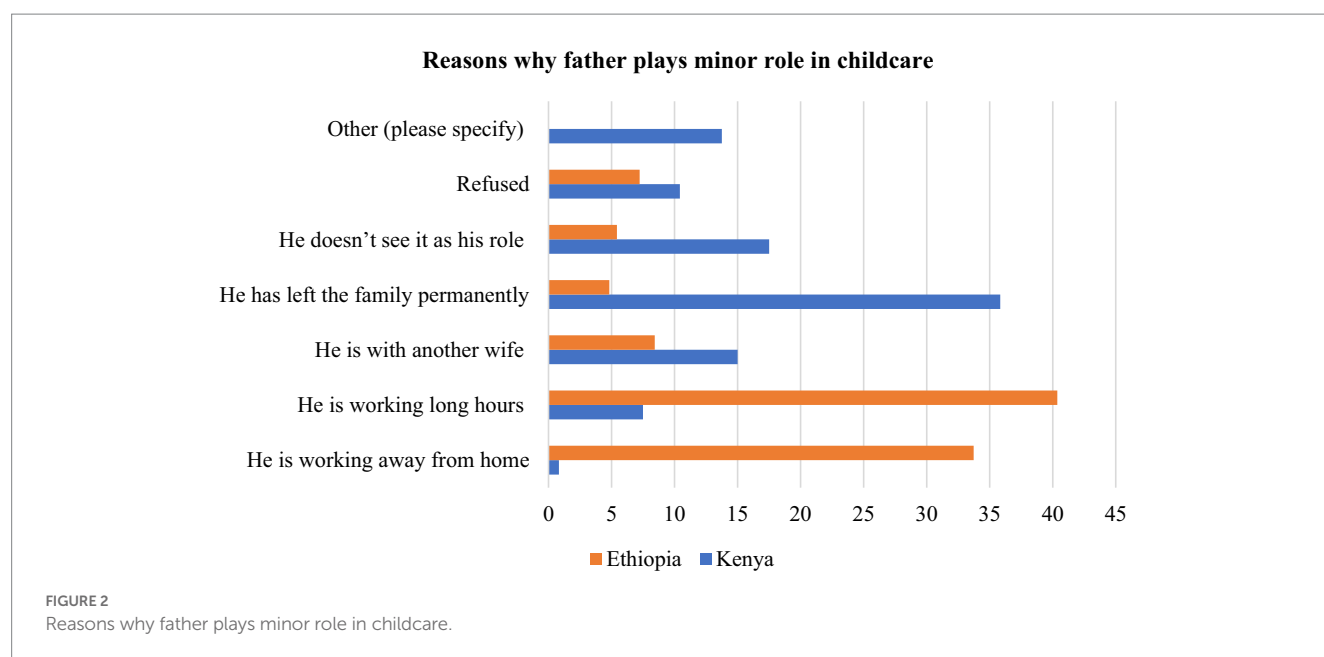
The respondents were asked as a general perception question, whether they thought the fathers played a major, minor or no role in providing care for their children. This was intended to gauge, from a bigger perspective without going into details, what they thought the contribution of fathers to childcare was. As can be seen from [Figure 1](#), more than half of the respondents (57%; $N = 307$ in Ethiopia and 74%; $N = 324$ in Kenya), indicated that the father plays a major role in upbringing young children aged 0–3 years while a significant number of participants (35.5% in Ethiopia) said the father plays a minor role in upbringing young children under the age of three. For those who play no role in child rearing, the greatest number (10.80%) was in Kenya against 5.86% in Ethiopia.

Reason why father plays a minor role

The reasons advanced for the minor role being played or for the absence of a father in taking care of the child varied across the two countries. The central reasons mentioned by respondents from Ethiopia were that he is “working long hours” (40.36%) and that he is “working away from home” (33.73% in Ethiopia) as shown in [Figure 2](#). In Kenya, the chief reasons are that he “has left home permanently” (35.83%) or “he does not see it as his role” (17.5%). The other reasons pointed out by the respondents include: ‘he is with another wife’, which at 15.3% is more significant in Kenya compared to Ethiopia where it stands at 8.43%. Approximately 10.42% in Kenya do have refused ‘to accept as his responsibility’. These facts illustrate that fathers are absent in two ways: (a) they are absent from the homes their children live, and (b) they are absent from the health, social, and educational services designed to improve the well-being of their children (13, p. 152–153). This is illustrated in [Figure 2](#).

Data obtained from structured interviews and focus group discussions also confirmed the reasons behind the absence of fathers





from the involvement in childcare. A member of the management of one of the flower farms who was interviewed on childcare issues commented on the absence of fathers from the health and emotional wellbeing of the child as follows:

Traditionally, the house chores are left for women. Men are mobile; they take risks and move from place to place, for various reasons. Hence, most of the domestic work as well as the responsibility of raising children rests on women. Even in cases where both parents are here [in the company], it is the mother who is more emotionally affected and become responsive when their children are ill. Even among our colleagues, who are parents, I have never seen the fathers calling home and checking on their children. It is the mothers who check if their children are well, fed properly, asleep, etc. I would be happy to see such mindset is changed and men are also involved in taking care of their children.

Although the absence of men from the childcare and child upbringing at a close level is the most common pattern in the study areas, the entire picture is not gloomy as there are few exceptional cases that have been reported. A woman working in a flower farm and interviewed for this study happened to have understanding and responsible husband. She recounts:

Many of them [her work-mates] do not have anyone to leave their babies with. Some would beg neighbors to babysit their children, but when the mothers return, they find their babies covered with dirt. The mothers then will take the babies home and shower and change them. As my husband babysits her, I have a peace of mind. Other kids face a wide range of challenges. Some mothers bring their sisters and brothers from countryside to babysit their babies. I myself went to the countryside and tried to find a relative to babysit my baby, but I couldn't find one. Then, my husband decided to stop working and stay home for her.

Fathers' financial contribution to childcare

The involvement of men in the care of young children has direct benefits to children, one of which is resource allocation. The financial contribution of the father for child upbringing has been reported to be significant in that about half of the fathers (48.1% in Kenya and 46.10% in Ethiopia) cover all the costs of the child. Kenya, at 21.9% compared to Ethiopia at 8.2% has the highest proportion of fathers that are reported to contribute nothing financially to the upkeep of their three-year-old children. This information is illustrated in Figure 3.

Frequency of fathers engagement in child upbringing

Fathers play a prominent role in the development of their children. As such, we sought to know how frequently fathers were involved with their children in play, in interaction with them.

According to information contained in Figure 4, Nearly equal proportions of the respondents (48.85 and 49.07% for Ethiopia and Kenya respectively) described the involvement frequency of the father in child upbringing as occurring daily. Yet a significant proportion of the caregivers stated that the father rarely or never gets involved in child upbringing. Some 8.52% of mothers from Ethiopia and 16.98% from Kenya reported that the father never engages himself with the child. These could be the fathers who are either working away from home or who have other wives.

Caregiving arrangements

As per the interviews conducted with some mothers, there are some informal home-based daycare services which come up now and then run by individuals in the neighborhoods who baby-sit young

Financial Contribution of Father to Childcare

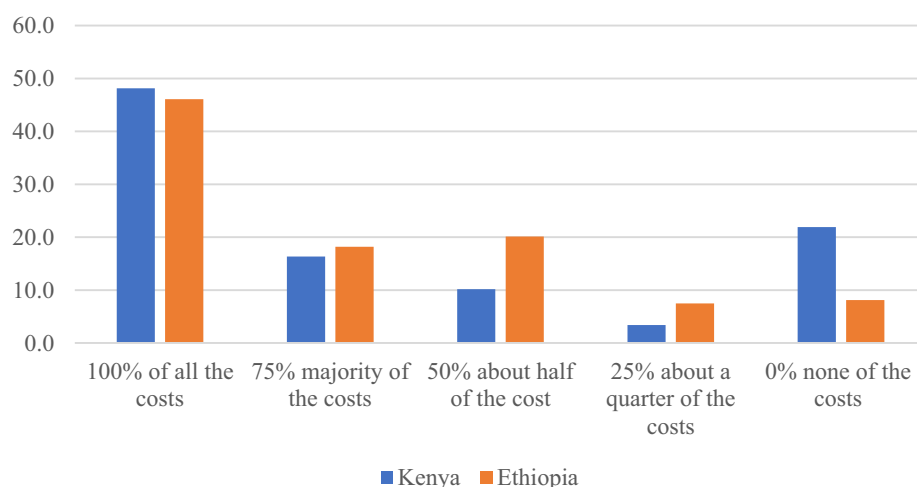


FIGURE 3
Financial contribution of father to childcare.

Frequency of Father Involvement in Childcare

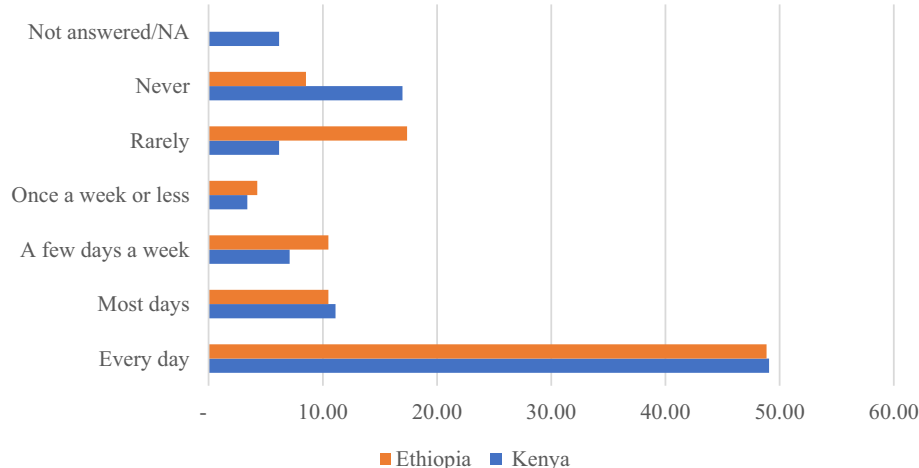


FIGURE 4
Frequency of father involvement in childcare.

children. in the Kenyan arm of the study, a quality assessment was conducted in 17 home-based daycare centers. These informal arrangements happened to be sub-standard as the care takers have neither the knowledge nor the facility required to take care of young children. A woman working in a flower farm and interviewed has shared the following regarding the potential risk involved with informal baby-sitters.

I had a neighbor who had a daycare. I don't know what she was going through, one day, she committed suicide, throwing herself from a water tank tower. When people arrived, they found a suicide note stating that she committed suicide. The kids she was looking after were on the open space, all by themselves. Anything could have happened to the children, as they had no one keeping an eye on

them. You see, leaving your children even at such facilities is not free of risks.

On the use of older siblings and relatives as babysitters, a member of the management of one of the flower farms who was interviewed has the following to say:

Sometimes, mothers leave their babies with very young children, who themselves would normally need baby-sitters. I have recently seen such a case where the baby-sitter was hardly older than the one being watched. Children would be highly affected if they do not get adequate food. How could children as young as these ones properly serve even prepared food, let alone cooking and feeding the babies they baby-sit or themselves? This is hard to imagine... It is because

there are no such facilities around this area that mothers are forced to leave their babies to very young baby-sitters, who are not older and more mature than the babies they baby sit.

A mother who employed an 11-year-old baby-sitter for her 7-month-old child tells how she negotiated with the mother of the babysitter to keep the baby-sitter out of school.

How do you babysit your child?

I have a maid, who also babysits him.

How old is she?

She is 11 years old.

Doesn't she go to school?

She is out of school at the moment.

Is she a drop out?

Yes. I begged her mother to let her stay with me; and the mother agreed.

She is just 11 years old; does she properly babysit your baby?

Yes, she can. As for feeding the baby, I am the one who prepares food and everything. All she has to do is feed the baby. I wake up 5am in the morning and get everything prepared until 7am.

A related issue to the left alone children or those who have been left with older siblings and relatives is the lack of breastfeeding policy provision that stipulates women's right to breastfeed their children. Studies show that "labor policies in many sub-Saharan African countries remain silent on women's right to breastfeed their children. For example, Ethiopia, Kenya, South Africa and Namibia make no legal provision for working mothers to breastfeed - even though the last has a national agenda aimed at promoting exclusive breast-feeding for the first 6 months of children's lives" [(5), p. 49].

In commercialized flower farms considered in this study, there are no crèche provisions within the compound of the flower farms that facilitate the breastfeeding of children of the working mothers. But the managements of the flower farms have allowed mothers with young children to be off duty for an hour so that they can breastfeed their children. Feeding children in the middle of the working day appears to be inconvenient to most mothers as the 1 hour off-duty also include transport time as well feeding time.

A woman who breast-feeds her child within the permitted one-hour time describes her situation as follows:

Is your house far away from here?

Yes, it is far.

How long does it take you to walk there?

Half an hour.

Does that mean, a two-way walk takes you an hour?

Yes.

So, how can you manage to breastfeed your baby?

The break time is not adequate. But, since it's the decision of the company, what could we do? I am not able to properly breastfeed my baby or take rest for myself. The break time is very short.

An accident which is related to breastfeeding of a child in a rush has also been reported by a work-mate.

Very recently, a mother returned from home, having breastfed her baby. When she got here, she was called back and when she got home, she found her bay died from the breast milk he choked on. We are always in rush for work. We leave our children home and run. It is hard to pay close attention to our babies when we are in such a rush. This mother thought that her baby was asleep. The babysitter didn't notice either. It was the baby's uncle who found out that the baby was dead, when trying to wake him up. The mother could not even afford to pay for the essentials of the funeral. Her workmates had to contribute towards the expenses. There are lots of problems of this kind. The company does not care for our children.

Network of families, neighbors, and community members

Due to the total absence of childcare services in the study area, childcare services are predominantly home-based. Other than the mother, many other people are involved in childcare services. As can be gathered from Table 3 below, 64.5% of the childcare services are provided by network of families and neighbors. In the category of caregivers, the key stakeholders are unpaid neighbors, household workers, siblings and community members in that order. For instance, 43.3% of the respondents stated that they are supported by unpaid neighbors who look after their under three-year children regularly; around 11.5% of the respondents noted that older siblings (aged between 13 to 18 years) are involved in taking care of the children. While 9.7% the respondents reported that younger siblings below the age of 12 look after their young children. Studies reported there is a significant routine involvement of children aged five and above in various care-related activities in Ethiopia and the figure has been estimated to be up to 45% [(5), p. 36].

While much of the childcare work is done by family members and neighbors, 23.6% of the respondents reported that they depend on paid caregivers to take care of their babies. Only 4.9% claim to use childcare centers and 6.5% pre-primary schools. Given the total absence of daycare centers and pre-primary facilities that can take care of children between 0–3 years of age, it is possible that these respondents have accessed the informal childcare arrangements. Interviews conducted with female workers that moved from their home villages to the area of commercialized farms in search of jobs has shown that they brought their younger siblings to help them as caregivers to their infants, which is the case of unpaid care work that also forces the younger siblings to become dropouts from school. In the absence of older siblings to step in, it is common in Ethiopia to 'foster' poorer relatives in exchange for support for schooling (Ibid, p. 40).

TABLE 3

Care givers	Every day	3–5 times per week	1–2 days per week	Less often	Not applicable
	No (%)	No (%)	No (%)	No (%)	No (%)
Neighbors (not paid)	43 (14.0)	9 (2.9)	9 (2.9)	72 (23.5)	174 (56.7)
Neighbors (paid)	3 (1.0)	2 (0.7)	3 (1.0)	12 (3.9)	286 (93.5)
House help	58 (19.0)	3 (1.0)	1 (0.3)	10 (3.3)	234 (76.5)
Siblings aged below 12 years	22 (7.3)	2 (0.7)	0 (0.0)	5 (1.7)	274 (90.4)
Child-to-child care	0 (0.0)	1 (0.3)	1 (0.3)	5 (1.6)	299 (97.7)
Siblings aged 13–18 years	14 (4.6)	3 (1.0)	4 (1.3)	14 (4.6)	271 (88.6)
A day-care/ baby care center	6 (2.0)	1 (0.3)	3 (1.0)	5 (1.6)	291 (95.1)
An ECD center	2 (0.7)	4 (1.3)	3 (1.0)	7 (2.3)	290 (94.8)
Pre-primary school	5 (1.6)	4 (1.3)	6 (2.0)	5 (1.6)	286 (93.5)
Someone else	15 (4.9)	7 (2.3)	3 (1.0)	16 (5.2)	265 (86.6)

Neighbors happened to be the main actors in filling the gap created by the total absence of childcare services in vulnerable communities. The questionnaire interview has further revealed that 43.3% of the respondents involve their neighbors (unpaid) to look after their 0–3-year-old children; 14% on daily basis, 5.8% intermittently per week and 23.45% less often. All respondents from Shiromeda site reported that they do not pay for neighbors who involve in childcare services.

In Kenya, most of the providers of alternative childcare and in whose custody, mothers would leave their children include siblings below 16 years old who accounted for 40% of the caregivers. This means these siblings have to either drop out or skip school. Other significant caregivers are unpaid neighbours (18%) and siblings of 16 years and above as is indicated in Table 4.

The category with the lowest uptake as alternative caregivers for mothers in the study sites in Kenya are the neighbours that are paid.

Discussion

The father in childcare

This study which was conducted both in Ethiopia and Kenya revealed that fathers are fairly involved in child upbringing though mostly not through direct one-to-one involvement but through providing necessary resources. Only 57.7% in Ethiopia and 74% in Kenya play a major role in the provision of childcare; while around 35 and 5.86% of fathers in Ethiopia play a minor role or no role in the upbringing of their children aged 0–3 years, respectively. Fathers are absent from the provision of childcare in two ways. Either they are physically absent from the homes of their children live or they are emotionally absent from the health, social and educational services designed to improve the well-being of their children. The frequency of involvement of fathers shows that only about half of the fathers (48% in Ethiopia) involve regularly in the upbringing of their children. Such levels of the absence of fathers, physical or emotional, in the childrearing and nurturing is unfavorable to the well-being of children.

The availability and involvement of fathers is believed to contribute to the emotional well-being of children in general; and

father's presence has the benefits of reducing aggressive behavior of boys and increasing the self-esteem in girls [(13), p. 157]. Hence, how often the father spends time with the child would be beneficial to the well-being of the child.

The role of a father in upbringing young children is a vital component of child development. In Ethiopia and Kenya, as in other African countries, care responsibility is considered to be the burden of the mother. But the burden of care on women has serious implications on their earnings, their productivity, and type of work they do, their chance of being employed. This care burden also has a negative effect on mother's participation in the workplace (5). Studies have shown that the absence or exclusion of a father from childcare is detrimental to children's development because "men are an essential part of a child's world; men need to hold up half of the child's sky" [(13), p. 151].

According to African culture, both parents play different but complementary roles in childcare and child upbringing. Mothers, being the ones who bear children play mostly a nurturing role whereas fathers play an instrumental role of providing the means of sustenance as well as security (14). However, in the contemporary society, the roles have become somewhat blurred, and mothers as well, play a significant role in providing for their households.

On the other hand, due to the changing relationship of women with regard to their engagement with the labor market, the burden of care on women has posed serious implications in the life of millions of mothers and the society at large. The upshot of these challenges is that, due to the competing pressures on adult's time and resources, significantly high proportions of children were left alone without adult supervision. Close to 40% of mothers reported that they are forced to leave their young children under three with others. Similarly, young children are left with their old siblings and relatives at an early age; and the age of older siblings and relatives a child can be left with is as high as 16 years and as low as 4 years which put the safety of the children in question.

Quite many children in many parts of the world are not receiving adequate care due to the competing pressures on adult's time and resources. It has been reported in the literature that in 53 low- and middle-income countries 20% of children under five were without adult care and they are either left alone or in the care of a sibling under the age of ten [(5), p. 14–15]. The critical factors contributing to a

TABLE 4

Caregivers left with children	Kawangware		Naivasha		Total	
	N	Percent	N	Percent	N	Percent
Neighbours (not paid)	18	32.1%	1	4.8%	19	18%
Neighbours (paid)	1	1.8%	3	14.3%	4	8%
Siblings aged below 16	15	26.8%	11	52.4%	26	40%
Siblings aged 16 or above	14	25.0%	1	4.8%	15	15%
A daycare/ babycare centre	7	12.5%	3	14.3%	10	13%
Other	1	1.8%	2	9.5%	3	6%
Total	56	100.0%	21	100.0%	77	100%

decision to leave children without adult care include parental unavailability (particularly lack of involvement of fathers) and poor working conditions, limited support networks, and the inability to afford childcare services (Ibid).

Childcare services are predominantly home-based due to the nearly total absence of childcare services in informal settlements under study in Ethiopia or lack of affordable childcare services in both Kenya and Ethiopia. As a result, childcare services are mainly provided by a network of families and neighbors. Parents and guardians in the informal settlements under discussion had access to a mix of care arrangements including both unpaid and paid neighbors, young siblings, and in a limited cases daycare services.

Recommendations

It is recommended that governments at different levels consider investing in childcare services in informal settlements. Government intervention is recommended to move childcare from a mere business enterprise towards a center for child development. The ECD policy as well as the family law and the labor market policies in Ethiopia in particular are either silent or indifferent on some pertinent issues of ECD such as extended maternity benefits (that includes the informal sector), policy on paternity and parental leaves as well as policy on crèche provisions. There is, therefore, a need to instigate serious changes in care-related policies by making labor market policies sensitive to care.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Kenyatta University Ethical Review Committee and Institute of Ethiopian Studies of Addis Ababa University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

GO and MY were the two principal investigators for this study and contributed equally to this work including overseeing study design, data collection and analysis and synthesis and writing and revising the research manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The feasibility, acceptability, cost and benefits of a “communities of practice” model for improving the quality of childcare centres: a mixed-methods study in the informal settlements in Nairobi

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Background: Informal childcare centres have mushroomed in the informal settlements of Nairobi, Kenya to meet the increasing demand. However, centre providers are untrained and the facilities are below standard putting children at risk of poor health and development. We aimed to co-design and test the feasibility, acceptability, cost and potential benefits of a communities of practice (CoP) model where trained community health volunteers (CHVs) provide group training sessions to build skills and improve practices in informal childcare centres.

Methods: A CoP model was co-designed with sub-county health teams, centre providers and parents with inputs from Kidogo, government nutritionists and ECD experts and implemented in 68 childcare centres by trained CHVs. Its feasibility and potential benefits were measured quantitatively and qualitatively. Centre provider ($n = 68$) and CHV ($n = 20$) knowledge and practice scores before and after the intervention were assessed and compared. Intervention benefits were examined using linear regressions adjusting for potential confounding factors. We conducted in-depth interviews with 10 parents, 10 CHVs, 10 centre providers and 20 local government officials, and two focus groups with CHVs and centre providers. Qualitative data were analysed, focusing on feasibility, acceptability, potential benefits, challenges and ideas for improvement. Cost for delivering and accessing the intervention were examined.

Results: The intervention was acceptable and feasible to deliver within existing government community health systems; 16 CHVs successfully facilitated CoP sessions to 58 centre providers grouped into 13 groups each with 5–6 centre providers, each group receiving four sessions representing the four modules. There were significant improvements in provider knowledge and practice (effect size = 0.40; $p < 0.05$) and quality of centre environment (effect size = 0.56; $p < 0.01$) following the intervention. CHVs' scores showed no significant changes due to pre-existing high knowledge levels. Qualitative interviews also reported improvements in knowledge and practices and the desire among the different

participants for the support to be continued. The total explicit costs were USD 22,598 and the total opportunity costs were USD 3,632 (IQR; USD 3,570, USD 4,049).

Conclusion: A simple model delivered by CHVs was feasible and has potential to improve the quality of informal childcare centres. Leveraging these teams and integration of the intervention into the health system is likely to enable scale-up and sustainability in Kenya and similar contexts.

KEYWORDS

communities of practice, childcare centre, feasibility, benefits, quality

Background

There is clear evidence that investing in early childhood development (ECD) during the critical period between birth and 5 years of life can have lasting benefits in the life of the child (1), reduce health inequities and boost individual, social and economic development (1–5). Increasing global focus on early childhood health and development is anchored within the Sustainable Development Goals (SDGs), particularly SDG 4 which is relevant to young children's health, safety and development (6). Further, global leadership comes from the 71st World Health Assembly where, in 2018 the Nurturing Care Framework for Early Childhood Development (7) was established to provide a broad framework for supporting the development of children from pregnancy up to age 3. Despite this, 250 million children aged less than 5 years are at risk of not achieving their full developmental potential (1), the majority (67%) of whom are from sub-Saharan Africa (SSA). Multiple adverse exposures including poverty, malnutrition, disease, exposure to injuries and unstimulating environments underlie suboptimal child development in low- and middle-income countries (LMICs) and children living in extremely impoverished settings are particularly at risk since poverty limits access to quality health care, balanced diet, quality education and a nurturing home or preschool environment (2, 8).

Despite the increased focus on ECD, limited attention has been given to the development and provision of childcare centres in LMICs. The focus on childcare is particularly important in this era of rapid urbanization, with over half the world's population living in urban settings. It is estimated that by 2050, 56% of the population in Africa and 64% in Asia will be living in towns and cities (9). Urbanization brings with it social, economic and cultural changes and has been identified, in itself, as a determinant of health (10). Rapid urbanization has brought changing work patterns with increases in female employment outside the home, resulting in a pressing need for childcare options particularly in low-income urban settings. The changing socio-cultural context in the urban settings in Kenya and in similarly rapidly urbanising cities provide limited options for childcare. Child care for children 0–3 years (preschool age) is commonly provided by the mother (or less often other family member) at home or at her workplace, or by paid childcare in centers where children are kept during the day while their mothers are out working. In these centers, children are expected to be fed, kept healthy and clean, and to have a stimulating environment for learning. There are also informal arrangements where a neighbour is requested to take

care of the child (11, 12). The choice on which strategy is used is determined by the family socio-economic factors and the broader context of living in urban informal settings (12). Unlike in the rural settings, families in the cities have no extended family around, and this means that that women who are the primary and often sole caregivers for children often opt for paid childcare, yet they live on a meagre pay which only affords cheap and low quality childcare services for their children.

Quality childcare centres have the potential to provide multiple benefits to children, families and communities (7) through enabling women's participation in the labour force (13–17). There are bi-directional benefits as increases in women's employment have the potential to provide indirect benefits to the child through increased household income and improved nutrition (18). A framework for providing quality childcare is found in WHO's Nurturing Care guidelines which specifies that an environment should be healthy, safe, hygienic, provide nutritious food and responsive nurturing care (7). Ensuring that centre providers understand these elements and can apply them to their centres is critical for programmes that train and support centre-based care providers. While there are still significant gaps in the evidence of impacts of childcare on children's cognitive, socio-emotional and physical health in high-income and particularly, LMIC contexts (18, 19), the role of a responsive caregiving and nurturing environment is increasingly recognized and emphasized (20). A well-facilitated childcare centre that provides opportunities for learning and play, good feeding and promotes good health has the potential to nurture and optimize child development (21–24). On the other hand, childcare centres with limited cognitive stimulation are likely to hold back children's development (25).

While there are gaps in policy provision in Kenya, the Government of Kenya has outlined guidelines for childcare centres such as the Early Childhood Development Service standard guidelines that were instituted in 2006 (26). However, due to lack of resources, limited training, low supervision and absence of assessment tools, many childcare centres do not meet the minimum standards of care (27) specified in the Kenya ECD guidelines (26). This is particularly the case in informal settlements where providers, who are almost exclusively women, are frequently untrained and unsupported. Care is offered in one or two rooms with limited facilities to provide a hygienic, safe and stimulating environment. Estimates of the number of such childcare centres in informal settlements in Nairobi put the figure at 2700 (27) but should currently be much more than this. Therefore, many children are at risk of

receiving inadequate care and nurturing during the critical period of their development, which in turn is detrimental for their future learning and wellbeing (28). Given the poor quality of childcare centres in LMICs particularly in impoverished settings due to lack of resources, lack of skills on the part of the childcare centre providers and absence of clear guidelines to regulate centre-based childcare, our programme of research aimed to support the improvement of the quality of centre-based childcare in line with the WHO's nurturing care guidelines (7). The intervention was co-designed by centre providers, community health teams, parents, local and national government and is described in detail in a sister paper (29). This study aimed to assess the feasibility, acceptability, cost and benefits of the CoP intervention for improving the quality of childcare centres. Our expectation was that by imparting the childcare centre providers with the necessary knowledge and skills of childcare provision they would improve the quality of care they provide.

Methods

Study design

This was an uncontrolled pre-post study that utilized both quantitative and qualitative methods. It was the final phase of a three phase study which employed a sequential mixed-methods (30) design (illustrated in Figure 1). The overall study aimed to answer the following objectives: (1) To map and assess the childcare environment and provider skills in informal settlements; (2) To co-design with

childcare providers, parents, government and ECD experts a supportive assessment and skills-building community of practice (CoP) approach which can be delivered at scale within informal settlements in Kenya; (3) To assess the feasibility acceptability, benefits and costs of delivering the co-designed model over a six-months' period in two informal settlements in Nairobi (Korogocho and Viwandani). Here we report the findings of objective 3 covering the final evaluation of feasibility acceptability, benefits and costs of the co-designed model. The codesign process is described in Oloo et al. (29) and the findings on the factors influencing the quality of childcare centres are presented in Nampijja et al. (awaiting publication). In this study, we aim to test the feasibility, acceptability, benefits and the cost of a co-designed CoP model on the centre quality, and the knowledge and skills of the centre providers and CHVs.

Study setting

The study was conducted in two informal settlements (Korogocho and Viwandani) in Nairobi, Kenya. These settlements were selected as their population includes a high proportion of women working outside the home the majority of whom work for a daily wage in the informal sector.

The socio-demographics profiles of these communities have been well characterized by the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) (31), within the African Population and Health Research Center, (APHRC). Korogocho and Viwandani, located about 7 km from each other, are densely populated with 63,318

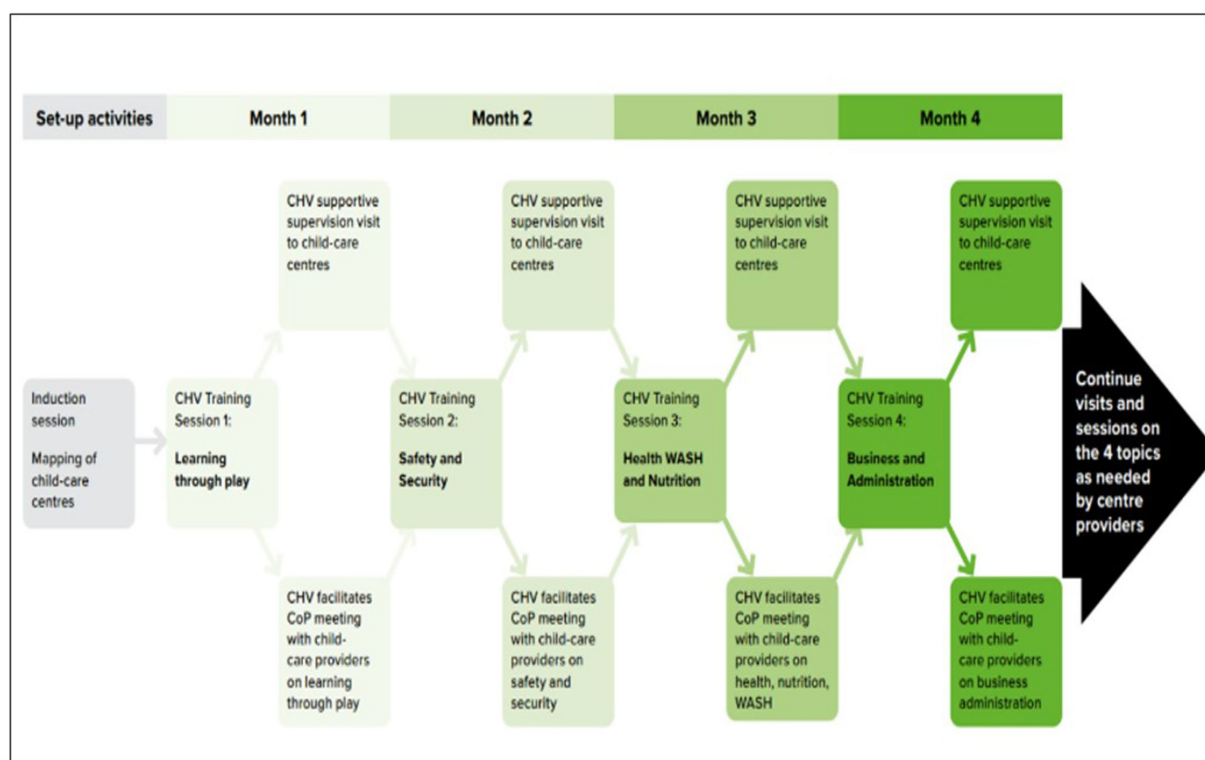


FIGURE 1

The planned intervention process. This shows the sequence of how the different data collection and co-design activities were undertaken. Activities that come earlier (on top) inform subsequent activities and so on.

and 52,583 inhabitants per square km, respectively. The settlements are characterized by poor housing, poor sanitation, lack of basic infrastructure, insecurity, high crime rate and poor access to maternal and child health (MCH) services and health care in general (31). The two communities were selected because they represent the poverty spectrum on which informal settlements in Nairobi lie, with Viwandani (which is close to the industrial area) being relatively less poor than Korogocho (31, 32). This variation enables the transferability of our findings to a wide range of urban-poor settings in sub-Saharan Africa.

To meet the childcare needs of families in these settlements, there are many informal, low quality, but affordable childcare centres (Nampijja et al. awaiting publication – predictors paper). Following our initial mapping exercise, we categorised childcare centres as: (i) faith-based run by and often located within religious institutions, (ii) centre-based, small centers often run by NGOs or private organisations, (iii) home-based run from within a resident's (predominantly women) own house with limited facilities or training, and (iv) school-based attached to a primary school. Following the mapping of childcare centres and co-design workshops with local government, community health teams, parents and childcare centre providers, school-based centres were excluded from the intervention implementation (29). This allowed the intervention to focus on the lowest quality and least supported home-based, and small centres (faith-based and centre-based).

The intervention and its implementation

The co-designed intervention includes training of CHVs to deliver a series of monthly group meetings with approximately six childcare providers in their catchment areas (each CHV is responsible for approximately 100 households in which they routinely support health care programmes). CHV training and subsequent CoP meetings cover: (i) learning through play including making toys from locally available material, (ii) safety and security including child safeguarding, (iii) essential child health, sanitation, hygiene, and nutrition, and (iv) business management including tracking income and expenditure (see Figure 1). Group meetings are facilitated by the CHVs and run as communities of practice (33) to allow centre providers to share experiences and apply learning to their own centre context. In between the CoP meetings, CHVs visit centres to support them to implement what they have learned. Details of the intervention are specified according to the TiDieR guidelines (34) in the [Supplementary materials](https://www.york.ac.uk/media/healthsciences/documents/research/public-health/Implementation%20Manual.pdf). The implementation manual for the intervention can be found here <https://www.york.ac.uk/media/healthsciences/documents/research/public-health/Implementation%20Manual.pdf>.

Following the initial mapping (29) we conducted baseline assessments of 68 centres (16 Korogocho and 52 Viwandani). All were invited to participate in a six-month pilot of the intervention and all accepted. While we planned 6 months for the pilot, due to COVID 19 restrictions, the pilot had to be completed within 5 months. Following discussion with the CHVs and providers, 13 groups of CHVs each comprising 5–6 centre providers were established, hence we had 3 groups from Korogocho and 10 from Viwandani. Further changes to the planned intervention were required due to COVID restrictions and the shortened time-frame

for implementation. The supervisory visits to the centres by the CHVs which were initially planned to be done every after a module, only began in month 3 of the intervention and only two visits to each centre were possible. During the visit, CHVs monitored any changes in the childcare environment including care providers' skills and practices, and advised childcare providers as necessary. A short and simple assessment tool developed during the co-design phase, was used to collect these data. It had 22 items including three on child safety and stimulation; three on responsive caregiving; three on learning through play; two on health; two on nutrition; four on WASH; two on parental engagement; and two on management and administration. Advice was given to the centre provider based on which areas needed more support. Certificates were given to centre providers and CHVs involved in the intervention as a means of recognising their involvement and to provide motivation. More information on the intervention are available in a related manuscript (29).

Outcomes definition and measurement

Study outcomes included those related to the implementation process, i.e., the feasibility and acceptability of the intervention; potential benefits of the intervention, and cost of its implementation. Feasibility and acceptability were assessed using data from the simple assessment tool, and implementation observations as well as qualitative interviews that captured perspectives of community health teams (local government, CHAs and CHVs), centre providers and parents. Intervention benefits were measured quantitatively using centre provider and CHV knowledge and practices scores, and centre quality scores. A costing tool was used to capture all relevant implementation costs. The outcome measures are summarised in Table 1, and the detailed procedures described in the section that follows.

Assessing feasibility, acceptability, and potential benefits of the intervention

Quantitative procedures

Feasibility and acceptability assessments: We analysed the results of the visit assessments conducted by CHVs and documented all aspects of the intervention including (1) the training and supervision of CHVs who deliver the intervention; (2) the number of supportive supervision visits made by each CHV to childcare centres; (3) the number of CoP groups established and sessions run, a record of participants in each group (number and names), the duration and topics covered.

To gain a more detailed assessment of the feasibility and acceptability, and content of the supportive supervision and CoP sessions, the research team observed eight CoP sessions (i.e., two for each of the four CoP groups) and 10 childcare centre visits over the 5-month implementation period. These observations followed an observation guide to identify facilitators and barriers facing the childcare providers in implementing the recommended skills and practices and reflections on the interaction between the CHVs and childcare providers. These were assessed by a team of trained field interviewers using Kidogo tools that were adapted to the informal settlements.

TABLE 1 Outcomes measures and tools used.

Outcome	Tools	Time points
Feasibility and acceptability	Simple assessment tool	Two supervisory visits during the intervention
	Implementation data (observations)	Periodically during intervention implementation
	Qualitative interviews with Centre providers, CHVs, CHAs and County officials	Baseline and endline
Benefits of the intervention	CHV KAP tool	Baseline and endline
	Centre provider KAP tool	Baseline and endline
	Centre quality assessment tool	Baseline and endline
	Qualitative interviews with Centre providers, CHVs, CHAs and County officials	Baseline and endline
Cost	Costing tool	During implementation period

Assessing intervention benefits: Baseline and endline assessments were, respectively, conducted in February and October 2021. The assessments included: (1) Knowledge and practices questionnaire for CHVs and providers on the key domains child protection, responsive caregiving, learning through play, health, nutrition, WASH, and business administration. (2) Detailed quality assessment of the centre environment based on the same domains assessed in the CHV and centre provider KAP. (3) Implementation data: We recorded of numbers of participants that attended each session, the number of sessions delivered, visits made to by each CHV. This information was collected by our research team and CHVs. KAP assessments were conducted virtually, while centre environment and observations of the sessions were done face-to-face.

Qualitative procedures

In line with our sequential mixed methods approach, the results of the questionnaires and changes in knowledge, attitude and practice scores were used to sample 10 childcare providers for qualitative interviews. The aim was to understand experiences from those who had improvement in their knowledge and practices, and those who did not. The interviews focused on the acceptability of the intervention and any challenges and barriers providers faced in improving quality in their childcare centres. Ten CHVs were selected based on their questionnaire scores to participate in interviews and also in two focus groups following 5 months of implementation. The interviews with CHVs captured their personal experiences of the training and implementation of the intervention. The focus groups allowed a more detailed discussion on the barriers and facilitators to implementation, possible improvements and potential sustainability within the community health system.

Because of the COVID-19 pandemic and related restriction on face-to-face interactions, in-depth interviews and KIIs were conducted virtually, while the FGDs were done face-to-face. The blended approach with face-to-face and remote options of data collection and engagements minimized physical contact and hence risk to infection transmission so that over the entire duration of the study, there was no case of COVID -19 reported among our teams and participants. We took extra measures to ensure that quality data was collected especially in the case where telephone or zoom interactions were conducted. These measures included spot checks with participants, and reviewing the data to ensure completeness of the questionnaires.

We conducted in-depth interviews with 10 parents whose children used the childcare centres involved in the CoP sessions to understand

if they had noticed any changes or had any feedback on the intervention. We interviewed 20 local government officials at different levels including national level, county level and sub-county level to identify any facilitators and barriers to implementation and their views on integration within the work of community health teams and possibilities for scale-up.

The number of respondents used for the different qualitative interviews were considered to be sufficient to provide representative views. For the policy makers and implementers interviews, all the participants who were involved in the intervention development were interviewed. However, for the CHVs and centre providers and parents, we selected 10 participants from each group with a representation from the two locations, and inclusion of CHVs, centre providers and parents from centres which had high, moderate and low scores in quality and skills on childcare at the end line assessments. Sample size of 10–20 participants included in the qualitative interviews for each group were considered sufficient to provide the required information. Purposeful sampling based on specific criteria allowed collection of balanced information on the participants' experiences of the intervention.

Qualitative in-depth interviews and focus groups were conducted by two researchers (LO and PA) experienced in qualitative methods and data collection with a detailed knowledge of the intervention and the context of childcare within the informal settlements. Interviews with providers were conducted in their centres in Swahili; interviews with parents were conducted in their homes in Swahili, and CHVs were interviewed at a community venue in Swahili while KII with Local government officials were interviewed in English both face-to-face (in their offices) and on phone/virtual. The focus groups were held in community centres. All interviews and focus group discussions were audio-recorded and transcribed as soon as possible after they were held. Interviews and focus group discussions were conducted in Swahili and later transcribed and translated for analysis.

Assessing costs of the intervention

We documented (1) number and duration of the training and supervision of CHVs and CHAs who delivered the intervention; and the number of trainers and trainees attended; (2) the number of supportive supervision visits made by each CHV to childcare centres and their duration; and (3) the number of CoP groups established and sessions run, a record of CHVs, CHAs and participants in each group (number and names), the duration and topics covered.

The explicit costs included fees, expenses or allowances paid for the training for the intervention (venue, refreshments, printing, trainers, CHAs and CHVs), and, delivery of the CoP sessions and follow-up supervisory visits (CHVs and care providers if applicable), including those borne by other partners. These amounts were recorded by the study team as part of financial records. We also estimated opportunity costs of time of the personnel involved by multiplying their respective hourly wage by their working time on the intervention. They were collected in local currency: Kenyan Shillings (KSh) 2021 prices and presented alongside USD for total costs (1 USD = 109.64 KSh) [IMF (2022). Exchange rates selected indicators (Internet). Available at: <https://data.imf.org> (Accessed March 7, 2022)].

Data management and analysis

Calculation of outcome scores

Quality of childcare centres scores: The quality of childcare centres was measured using a set of questionnaire items. The tool focused on nurturing care framework components namely: (i) child protection, safety, discipline and abuse, (ii) stimulating environment, (iii) responsive caregiving, (iv) learning through play, (v) health, (vi) nutrition, (vii) water, sanitation, and hygiene. Additionally, the items included the (viii) business and administration component which focused on the capability of centre providers to provide quality service while earning an income. Varying number of items was asked under each component. One score was assigned for each positive/correct response to an item and a score of zero otherwise. Then the total score was calculated for each component by adding up the scores corresponding to each item in that component. The component scores were converted to percentages to make them more intuitive. To obtain a component score of a childcare centre, their total score in that component was divided by the maximum possible score of that component and multiplied by 100. The overall quality score of a childcare centre was the mean of the individual component scores, that is, the sum of all component scores divided by the number of components. Details of the childcare centre quality tool and scoring system are provided in [Appendix 2](#).

Childcare providers KAPs scores: The childcare providers who agreed to the quality assessment visits were administered questionnaires to assess their knowledge and skills on nurturing care and business. The components of the questionnaire were similar to the quality assessment tool and included the following: (i) child protection, safety, discipline and abuse, (ii) stimulating environment, (iii) responsive caregiving, (iv) learning through play, (v) health, (vi) nutrition, (vii) water, sanitation, and hygiene and (viii) business and administration. The response to each question/item was assigned a score of one if it was positive/correct and zero otherwise (see [Appendix 3](#)). Component scores and overall childcare provider KAPs score were obtained the same way as the quality of childcare centre scores. Details of the childcare provider KAPs tool and scoring system are provided in [Appendix 3](#).

CHVs KAPs scores: The CHVs were assessed for their knowledge and skills around the nurturing care framework and their perceived competence on providing support supervision. Apart from the nurturing care components, the CHV KAPs questionnaire included two more components: providing support supervision of centre

providers, and attitude and perceived competence to provide support. Each questionnaire item was then assigned a score of one if positive/correct and zero otherwise ([Appendix 4](#)). The component scores and the overall CHV KAPs score were obtained in a similar way as the quality of care and care provider scores. Details of the CHV KAPs tool and scoring system are provided in [Appendix 4](#).

Data analysis

Quantitative cost and qualitative interviews focused on the feasibility, acceptability cost and benefits of the intervention. Accordingly, a mixed methods approach was used to analyse the different outcomes. Feasibility was mainly measured through qualitative data, however, quantitative indicators including numbers of participants who completed the program and number of sessions done were analysed.

Quantitative data analysis: Data management and analysis was done using STATA version 17. Descriptive statistics were used to summarize the data from the quality assessment tool and the knowledge and skills of centre providers and CHVs. Continuous variables were summarized using means (SD) and medians (IQR) depending on their distribution. Categorical variables were summarized using frequencies and percentages. These descriptive statistics were presented in tables. Bivariate analysis was done to compare outcomes between baseline and endline, e.g., comparison of centre quality scores before and after the intervention. To compare continuous variables, e.g., provider KAP score between baseline and endline, paired sample t-test was used since the study was uncontrolled pre-post. Comparison of proportions of binary variables (e.g., proportion of centres with a handwashing station) between surveys was done using paired proportions t-test. To evaluate the potential benefits of the co-designed CoP model on the centre quality, and the knowledge and skills of the centre care providers and CHVs, linear mixed effects regression model was used. The random effects variable in the models was the unique participant IDs. This model is appropriate for this analysis because in the determination of the association between the outcome and the exposure, it accounts for the correlation of repeated measures on of an individual. Simple linear mixed effects regression was used to obtain crude effects while adjusted effects were obtained from the multiple linear mixed effects regression model. For each of the three outcome variables namely: centre provider KAP score, centre quality score, and CHV KAP score, separate models (both crude and adjusted) were fit. The main independent variable in each of the three models was the survey round (pre-, post-intervention). In both centre provider KAP and centre quality models, the adjusted analysis controlled for the type of centre (home-based, centre-based, faith-based), centre provider age (years), centre provider highest education (primary, secondary, tertiary), location of the childcare centre (Korogocho, Viwandani), period of operation (years), and centre provider ECD training (yes, no). In the CHV KAP model, the adjusted analysis controlled for CHV age (years), CHV sex (female, male), CHV highest education level (primary, secondary, tertiary), and CHV area of operation (Korogocho, Viwandani). The effect size (standardized coefficient) and the corresponding *p*-values and the 95% confidence intervals were reported. Before running the regression models, each of the outcome scores were standardized by subtracting the baseline mean score from each observed score and dividing this by the standard deviation of the baseline score, e.g., to standardize the score of a centre provider KAP

TABLE 2 Characteristics of participants who participated in qualitative interviews.

	Attribute name										
	Gender		Location		Seniority			Sector		Level	
	Male	Female	Viwandani	Korogocho	Junior official	Senior official	Health	Education	National	County	Sub county
Centre providers	0	10	7	3							
CHVs	2	8	7	3							
Parents	0	10	7	3							
Policy makers	8	12			11	9	15	5	4	4	12

score, the baseline (the “control arm” in this study) centre provider KAP mean score was subtracted from her score and the result divided by the standard deviation of the centre provider KAP score. The coefficients from the regression were interpreted in terms of standard deviation differences (pre- vs. post-intervention) rather than mean differences.

Qualitative data analysis: An initial round of analysis of all qualitative data was conducted by six members of the team (LO, HE, PA, AR, PK-W, MN, and KO) to develop a coding frame. Following discussions among the team, the analysis framework was agreed and applied to all qualitative data by LO and PA. The framework included themes on feasibility, acceptability and experiences of the intervention as well as reflections on the potential for scaling up the intervention. Nvivo 2020 was used to organise the qualitative analysis. We compared, collated/triangulated the information from these different data sources, both quantitative and qualitative to understand acceptability of the intervention (35). The extent of convergence, divergence or silence between findings was identified following the development of an integrated results matrix (see Table 2) (36).

The meta-inferences were devised and discussed across our full team and shared with the stakeholders involved in the supportive assessment and CoP model throughout the study in a final dissemination workshop to ensure that our interpretation of the data adequately reflects their perspectives. The evaluation and the final inputs from stakeholders informed a final version of an implementation manual to facilitate the intervention to be integrated within the existing CHV structure and scale up of the model to other parts of Nairobi and countrywide.

Results

Profile of the childcare centres

A total of 58 centres completed the sessions and took part in the endline survey across the two informal settlements with 13 (22%) in Korogocho, and 45 (78%) in Viwandani (Table 3). Of these, 40 (69%) were home based and 11 (19%) centre based (autonomous centres operating in buildings purposely built for provision of childcare services) and 7 (12%) were faith-based centres. Home-based centres tended to have younger children aged 0–3 years (62%), while other types of centres had more children older than 3 years. Centre provider to child ratio was smaller among home based centres with a mean of 1 centre provider to 7 children, but in the other centres it ranged between 15 and 21 children for one centre provider. The ratio of boys to girls in the centres was fairly balanced and similar across the centres. Whereas most of home-based centres had been in operation for 0–2 years, a majority of centre-based and faith-based centres had been in operation for more than 2 years. The median amount charged per day for each child varied between the different types of centres, ranging from Ksh. 30 in the centre-based centres to Ksh. 50 in the home-based centres. The median charges per day for all the childcares was Ksh. 50, ranging from Ksh. 10 to Ksh. 100. One-tenth of the centres (10%) reported that they were supported by an organization. Overall, less than half (38%) of the centre providers had ECD training, with faith-based (86%) and centre-based (73%) centres having the highest proportion of trained providers while home-based (20%) had the least.

TABLE 3 Profile of the childcare centres.

Variable	Category/summary statistic	Home based (N = 40)	Centre based (N = 11)	Faith based (N = 7)	Total (N = 58)
Location	Korogocho, <i>n</i> (%)	5 (13)	5 (45)	3 (43)	13 (22)
	Viwandani, <i>n</i> (%)	35 (88)	6 (55)	4 (57)	45 (78)
Number of children in the centre	Median (IQR)	7 (4–11)	26 (15–36)	33 (20–54)	10 (5–20)
	[Range]	[1–25]	[7–60]	[11–105]	[1–105]
Number of children 0–3 years old	<i>n</i> (%)	274 (62.3)	116 (26.4)	50 (11.4)	440 (47.7)
Sex (boys)	<i>n</i> (%)	166 (49.2)	137 (46.1)	134 (48.2)	437 (47.9)
Provider to child ratio	Median ratio	1:7	1:15	1:21	1:8
Years of operation	0–2 years, <i>n</i> (%)	21 (53)	4 (36)	1 (14)	26 (45)
	3–5 years, <i>n</i> (%)	4 (10)	3 (27)	3 (43)	10 (17)
	6–10 years, <i>n</i> (%)	10 (25)	2 (18)	1 (14)	13 (22)
	>10 years, <i>n</i> (%)	5 (13)	2 (18)	2 (29)	9 (16)
Charges per day (KES)	Median (IQR)	50 (50–67)	30 (20–50)	40 (15–50)	50 (40–50)
	[Range]	[30–100]	[10–100]	[10–50]	[10–100]
Received support from any organisation	<i>n</i> (%)	4 (10)	1 (9)	1 (14)	6 (10)
Provider trained in ECD	<i>n</i> (%)	8 (20)	8 (73)	6 (86)	22 (38)
Provider interested in supervision visits	<i>n</i> (%)	40 (100)	11 (100)	7 (100)	58 (100)
Provider interested in group meetings	<i>n</i> (%)	40 (100)	11 (100)	7 (100)	58 (100)

TABLE 4 Centre provider socio-demographic characteristics.

	Home based (N = 40) <i>n</i> (%)	Centre based (N = 11) <i>n</i> (%)	Faith-based (N = 7) <i>n</i> (%)	Total (N = 58) <i>n</i> (%)
Location of centre				
Korogocho	7 (18)	5 (45)	3 (43)	15 (26)
Viwandani	33 (83)	6 (55)	4 (57)	43 (74)
Age (years)				
Mean (SD)	39.1 (7.7)	38.4 (8.1)	38.3 (12.6)	38.8 (8.3)
[Range]	[22–53]	[27–54]	[27–59]	[22–59]
Sex				
Female	40 (100)	10 (91)	7 (100)	57 (98)
Male	0 (0)	1 (9)	0 (0)	1 (2)
Highest education level				
None	0 (0)	0 (0)	0 (0)	0 (0)
Primary	24 (60)	2 (18)	1 (14)	27 (47)
Secondary	14 (35)	3 (27)	3 (43)	20 (34)
Tertiary	2 (5)	6 (55)	3 (43)	11 (19)

Socio-demographic characteristics of the childcare providers

Of the 129 centres identified, school based centres were excluded as they were not identified as a priority during the codesign process. The total number of home-based, small centre-based and faith-based centres eligible for detailed assessment was 68. Out of the 68 eligible childcare centres, 66 were surveyed at baseline while the other two were not reached. The 66 were included in the CoP sessions in Korogocho and Viwandani between March 25 and April 13, 2021, out of which 58 had

complete data in both baseline and endline surveys. These 58 centres/providers formed our panel for analysis. There were no significant differences in the baseline socio-demographic characteristics and outcome variables between the 58 care providers in the panel and the 8 who were not reached at endline (Appendix 1). All the 17 CHVs who took part in the intervention were interviewed in both surveys.

About three-quarters (74%) of the childcare centres were in Viwandani and almost all (98%) the centre care providers were female (Table 4). The mean age of the centre providers was 40 years, ranging from 23 to 63 years. Most of the care providers (43%) had primary education.

Childcare centre quality scores

Overall, there was a significant improvement in the centre quality score from 59% [95% CI: (56, 62)] at baseline to 66% [95% CI: (63, 69)] at endline ($p = 0.002$) (Table 5). There was a significant positive difference in three out of four domains measuring centre environment quality: Child protection, child safety, child abuse and positive discipline stimulating environment domain (from 67% to 78%; $p = 0.001$), learning through play domain (from 25% to 37%; $p = 0.019$), and business administration domain (from 33% to 63%; $p < 0.001$). Considering the type of centre, there was a significant and positive difference in the quality of care score in the home-based centres (from 55% to 65%; $p < 0.001$) while in the other two types, the differences were not significant (see Table 5).

Centre provider knowledge and practice scores

There was a significant positive improvement in the overall centre provider KAP score from 72% to 77% ($p = 0.005$). This improvement was driven mainly by the business management (from 56% to 75%; $p < 0.001$) and child nutrition (from 69% to 80%; $p = 0.001$) domains, each recording significant positive differences. Among the three centre types, only home-based centres registered a significant (positive) difference in the mean centre provider KAP scores (from 69% to 76%; $p = 0.001$) (Table 6).

Sociodemographic characteristics of the CHVs

Of the 20 CHVs who were trained for supportive supervision, 17 participated in the intervention and were interviewed in the baseline and endline surveys, hence formed our panel data for analysis. More than half of the CHVs were from Viwandani (59%). Their mean age was 48 (SD = 6) and most (88%) were female. A majority (71%) had at least secondary education.

CHV knowledge and practices scores

The 17 CHVs were assessed using the KAP tool, which span across eight domains. Overall, there was no significant changes in the level of knowledge and practices. Of the eight domains, only one showed a significant (positive) change, i.e., providing support supervision domain (from 78% to 94%; $p = 0.002$) (Table 7).

Feasibility and acceptability of the CoP intervention

Feasibility and acceptability was assessed quantitatively based on the number of CHVs that were effectively trained and conducted the CoP sessions and follow up visits, and the number of centre providers who successfully completed all the modules. This was with reference to the target numbers. As shown in Table 8, we achieved the target numbers of CHVs and centre providers and for both groups of

participants, we achieved the planned training/sessions and follow up visits in Korogocho and Viwandani. A total of 20 CHVs (10 from Korogocho; and 10 from Viwandani) were recruited and successfully trained on delivering the intervention. They attended all the four modules that were offered. All 10 CHVs from Viwandani facilitated one centre provider group each leading four CoP modules. In Korogocho, there were fewer centres ($n = 16$) that were eligible for inclusion in the intervention, so we purposefully used only 6 out of the 10 CHVs to lead the CoP sessions. The remaining four were put on waiting list to help in case any of the 6 became unavailable.

A total of 68 centre providers (16 from Korogocho; and 52 from Viwandani) were eligible for the intervention, and all accepted the invite to participate. These were grouped in groups of 5–6 centre providers for the CoP sessions. Each group was managed by a CHV in charge and one back up CHV. This resulted in three groups in Korogocho and 10 groups in Viwandani. Attendance records show that all 68 centre providers attended the four modular CoP intervention facilitated by the CHVs. 117 CoP sessions altogether were conducted by the CHVs and observed by the CHAs including 27 in Korogocho, and 90 in Viwandani. Hence a total of 136 follow up visits were successfully made by the CHVs.

Costs involved in delivering the intervention

The venue was rented at KSh 3,000/day for 9-day training in two occasions. The breakfast and lunch were provided at KSh 800/person-day for training and KSh 700/person-day for CoP sessions. The training programme was delivered by trainers from Kidogo and costed KSh 25,000/person-day for 20 person-days. The allowance paid to the CHVs and CHAs were KSh 1,000 per day and KSh 2000 per day for training and CoP sessions, respectively. The allowance paid to the CHVs for follow-up visits was KSh 700 per visit. A payment of KSh 200 per session was also given to centre providers to cover the expenses of arranging extra personnel when they attended CoP sessions, if applicable. Twenty CHVs and eight CHAs attended the training. Including necessary printing costs, the explicit costs of organizing and attending the training were estimated at KSh 1,094,100 (USD 9,979). Ninety-seven CoP sessions were delivered by two CHVs with one CHA and twenty were delivered by one CHV and one CHA. The payment for cover arrangement was given out on three occasions for each centre provider. The explicit costs of CoP sessions were therefore KSh 1,271,300 (USD 11,595). Each centre provider received two follow-up visits, costed at KSh 95,200 (USD 868). In addition, 16 CHVs and 2 CHAs were paid allowance for their activities in initial mobilization and CoP session organizing. This explicit administration cost was estimated at KSh 17,000 (USD 155).

To estimate the opportunity costs of time for CHVs and CHAs, the CHAs were costed at KSh 65,000 per month and the CHVs at KSh 3,500 per month, the latter of which had been proposed but yet to come in effect over the implementation period. The partially recorded CoP sessions indicated a median duration of 3.83 h/session (IQR: 3.35, 4.56) in Korogocho and 3.00 h/session (IQR: 3.00, 4.00) in Viwandani. The median duration of follow-up visits was 2.00 h/visit (IQR: 1.00, 2.00) in Korogocho and 1.34 h/visit (IQR: 1.00, 2.00). The opportunity costs of the CHAs were estimated at KSh 212,727 (USD 1,940) for attending training, KSh 137,940 (USD 1,258) for CoP sessions [IQR

TABLE 5 Baseline and endline centre quality scores.

	Home based (N = 40)			Centre based (N = 11)			Faith based (N = 7)			Total (N = 58)		
	Baseline	Endline	p-value	Baseline	Endline	p-value	Baseline	Endline	p-value	Baseline	Endline	p-value
Responsive caregiving												
≤15 children per provider; n (%)	40 (100)	40 (100)	NA	9 (82)	9 (82)	1.000	6 (86)	4 (57)	0.237	55 (95)	53 (91)	0.464
Daily routine is planned, posted and used; n (%)	1 (3)	5 (13)	0.090	4 (36)	3 (27)	0.647	3 (43)	3 (43)	1.000	8 (14)	11 (19)	0.452
Responsive care giving subtotal score; mean (SD)	100.0 (0.0)	100.0 (0.0)	NA	90.9 (20.2)	86.4 (32.3)	0.676	85.7 (37.8)	78.6 (26.7)	0.604	96.6 (15.8)	94.8 (18.0)	0.484
Play and early learning												
Children have something to play with; n (%)	6 (15)	24 (60)	<0.001	4 (36)	4 (36)	1.000	7 (100)	7 (100)	NA	10 (17)	28 (48)	<0.001
Separate area with play materials, toys, books, pens; n (%)	9 (23)	16 (40)	0.091	10 (91)	8 (73)	0.269	6 (86)	2 (29)	0.031	25 (43)	26 (45)	0.852
Early learning subtotal score; mean (SD)	13.3 (22.4)	37.5 (32.2)	<0.001	54.5 (27.0)	45.5 (27.0)	0.277	42.9 (25.2)	23.8 (31.7)	0.231	24.7 (29.0)	37.4 (31.3)	0.019
Child protection												
Child protection, child safety, child abuse and positive discipline stimulating environment; mean (SD)	63.6 (18.8)	75.4 (19.1)	0.004	74.0 (10.7)	84.4 (21.6)	0.136	75.5 (24.3)	79.6 (16.2)	0.703	67.0 (18.8)	77.6 (19.3)	0.001

(Continued)

TABLE 5 (Continued)

	Home based (<i>N</i> = 40)			Centre based (<i>N</i> = 11)			Faith based (<i>N</i> = 7)			Total (<i>N</i> = 58)		
	Baseline	Endline	<i>p</i> -value	Baseline	Endline	<i>p</i> -value	Baseline	Endline	<i>p</i> -value	Baseline	Endline	<i>p</i> -value
Health												
Centre has a first aid kit; <i>n</i> (%)	1 (3)	5 (13)	0.089	4 (36)	3 (27)	0.647	0 (0)	1 (14)	0.299	5 (9)	9 (16)	0.254
Thermometer and records of temperature check available; <i>n</i> (%)	1 (3)	1 (3)	1.000	3 (27)	1 (9)	0.269	3 (43)	1 (14)	0.237	7 (12)	3 (5)	0.186
Checks child health daily and knows what to do if sick; <i>n</i> (%)	35 (88)	36 (90)	0.723	10 (91)	10 (91)	1.000	7 (100)	5 (71)	0.127	52 (90)	51 (88)	0.768
Knows immunisation status of children; <i>n</i> (%)	26 (65)	34 (85)	0.039	8 (73)	10 (91)	0.269	2 (29)	3 (43)	0.577	36 (62)	47 (81)	0.024
Health subtotal score; mean (SD)	45.7 (16.9)	48.6 (17.7)	0.479	62.3 (25.8)	53.2 (20.3)	0.295	59.2 (12.9)	38.8 (13.6)	0.058	50.5 (19.5)	48.3 (17.9)	0.524
Water, sanitation and hygiene												
Handwashing station: water and soap; <i>n</i> (%)	26 (65)	23 (57)	0.491	11 (100)	10 (91)	0.306	7 (100)	6 (86)	0.299	44 (76)	39 (67)	0.303
At least one potty for every 5 children; <i>n</i> (%)	35 (88)	33 (83)	0.531	8 (73)	8 (73)	1.000	4 (57)	4 (57)	1.000	47 (81)	45 (78)	0.647
Centre is cleaned daily and visibly clean; <i>n</i> (%)	39 (98)	39 (98)	1.000	10 (91)	11 (100)	0.306	6 (86)	4 (57)	0.237	55 (95)	54 (93)	0.697
WASH subtotal score; mean (SD)	83.8 (19.2)	79.4 (18.7)	0.343	86.4 (20.5)	86.4 (17.2)	1.000	82.1 (18.9)	57.1 (27.8)	0.062	84.1 (19.1)	78.0 (21.0)	0.114

(Continued)

TABLE 5 (Continued)

	Home based (N = 40)			Centre based (N = 11)			Faith based (N = 7)			Total (N = 58)		
	Baseline	Endline	p-value	Baseline	Endline	p-value	Baseline	Endline	p-value	Baseline	Endline	p-value
Nutrition												
Children receive morning uji (porridge); n (%)	37 (93)	34 (85)	0.289	10 (91)	10 (91)	1.00	7 (100)	7 (100)	NA	54 (93)	51 (88)	0.342
Receive lunch; n (%)	38 (95)	37 (93)	0.644	10 (91)	11 (100)	0.306	7 (100)	7 (100)	NA	55 (95)	55 (95)	1.000
Children are served with warm food; n (%)	35 (88)	40 (100)	0.021	9 (82)	11 (100)	0.138	6 (86)	6 (86)	1.00	50 (86)	57 (98)	0.015
Poster of a balanced diet is displayed; n (%)	1 (3)	3 (8)	0.305	0 (0)	2 (18)	0.138	0 (0)	0 (0)	NA	1 (2)	5 (9)	0.094
Nutrition subtotal score; mean (SD)	69.4 (17.4)	71.3 (15.6)	0.596	65.9 (23.1)	77.3 (13.5)	0.176	71.4 (9.4)	71.4 (9.4)	1.000	69.0 (17.7)	72.4 (14.6)	0.231
Business administration												
Attendance register kept and available; n (%)	16 (40)	33 (83)	<0.001	10 (91)	10 (91)	1.000	7 (100)	5 (71)	0.127	33 (57)	48 (83)	0.002
Track finances with records; n (%)	12 (30)	32 (80)	<0.001	9 (82)	11 (100)	0.138	6 (86)	7 (100)	0.299	27 (47)	50 (86)	<0.001
Centre; n (%) policies/fees/schedules clearly posted; n (%)	0 (0)	7 (18)	0.006	1 (9)	3 (27)	0.269	1 (14)	2 (29)	0.515	2 (3)	12 (21)	0.004
Budget available; n (%)	7 (18)	22 (55)	0.001	4 (36)	8 (73)	0.087	4 (57)	6 (86)	0.237	15 (26)	36 (62)	<0.001
Business administration subtotal score; mean (SD)	21.9 (27.3)	58.8 (29.7)	<0.001	54.5 (21.8)	72.7 (17.5)	0.070	64.3 (24.4)	71.4 (22.5)	0.631	33.2 (30.8)	62.9 (27.4)	<0.001
Overall centre environment quality score (percent of correct responses)												
Mean (SD) centre quality score (%)	55 (10)	65 (11)	<0.001	69 (11)	72 (12)	0.391	68 (2)	60 (11)	0.093	59 (12)	66 (11)	0.002

The bold figures are p-values less than 0.05.

TABLE 6 Baseline and endline centre provider KAP scores.

Centre provider knowledge and practice scores (percent of correct responses)												
Centre type	Home based (N = 40) Mean (SD)			Centre based (N = 11) Mean (SD)			Faith based (N = 7) Mean (SD)			Total (N = 58) Mean (SD)		
Time point	Baseline	Endline	p-value	Baseline	Endline	p-value	Baseline	Endline	p-value	Baseline	Endline	p-value
Business management	48.0 (21.7)	72.3 (16.9)	<0.001	72.7 (13.5)	84.5 (6.9)	0.024	78.6 (6.9)	78.6 (22.7)	1.000	56.4 (22.8)	75.3 (16.8)	<0.001
Child safety	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	100.0 (0.0)	NA
Responsive caregiving	55.8 (38.8)	73.3 (33.9)	0.026	75.8 (39.7)	84.8 (27.3)	0.574	66.7 (27.2)	52.4 (46.6)	0.589	60.9 (38.1)	73.0 (35.0)	0.077
Learning through play	56.6 (17.5)	58.0 (16.4)	0.726	76.0 (9.3)	74.4 (14.6)	0.617	74.0 (12.2)	68.8 (11.6)	0.493	62.4 (17.8)	62.4 (16.8)	1.000
Child health	72.2 (18.1)	69.4 (16.5)	0.372	77.8 (19.2)	72.7 (17.5)	0.518	63.5 (16.6)	52.4 (17.8)	0.062	72.2 (18.3)	68.0 (17.5)	0.111
Child nutrition	67.5 (19.6)	78.0 (14.2)	0.002	76.4 (19.6)	87.3 (16.2)	0.140	68.6 (15.7)	77.1 (24.3)	0.482	69.3 (19.2)	79.7 (16.1)	0.001
WASH	83.1 (10.8)	80.9 (14.1)	0.385	78.4 (12.6)	81.8 (10.3)	0.493	73.2 (13.4)	66.1 (18.7)	0.386	81.0 (11.8)	79.3 (14.7)	0.424
Overall mean centre provider KAP score	69.0 (9.1)	76.0 (9.2)	0.001	79.6 (9.6)	83.7 (6.3)	0.158	74.9 (7.1)	70.8 (16.2)	0.588	71.7 (9.8)	76.8 (10.3)	0.005

TABLE 7 Baseline and endline CHV KAP scores.

CHV knowledge and practice scores									
Location	Korogocho (N = 10) Mean (SD)			Viwandani (N = 10) Mean (SD)			Total (N = 20) Mean (SD)		
	Baseline	Endline	p-value	Baseline	Endline	p-value	Baseline	Endline	p-value
Learning through play	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	100.0 (0.0)	NA
Child protection/responsive caregiving	78.6 (26.7)	78.6 (26.7)	1.000	85.0 (24.2)	95.0 (15.8)	0.168	82.4 (24.6)	88.2 (21.9)	0.332
Communication with child	97.6 (6.3)	100.0 (0.0)	0.356	61.7 (36.0)	63.3 (15.3)	0.909	76.5 (32.8)	78.4 (21.9)	0.814
Child nutrition	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	100.0 (0.0)	NA
Child health	89.3 (15.2)	92.9 (14.2)	0.569	91.3 (11.9)	100.0 (0.0)	0.045	90.4 (12.9)	97.1 (9.4)	0.058
WASH	97.6 (6.3)	88.1 (8.1)	0.030	96.7 (7.0)	100.0 (0.0)	0.168	97.1 (6.5)	95.1 (7.8)	0.431
Providing support supervision	82.1 (12.2)	96.4 (9.4)	0.030	75.0 (23.6)	92.5 (12.1)	0.025	77.9 (19.5)	94.1 (10.9)	0.002
Attitude and perceived competence to provide support	100.0 (0.0)	90.5 (16.3)	0.172	100.0 (0.0)	100.0 (0.0)	NA	100.0 (0.0)	96.1 (11.1)	0.164
Overall mean CHV KAP score	93.1 (3.4)	93.5 (4.1)	0.838	87.0 (6.6)	92.1 (3.8)	0.0862	89.5 (6.2)	92.7 (3.9)	0.098

TABLE 8 Feasibility and acceptability indicators of the intervention.

Activity	Target number	Number (%) achieved
CHVs recruited	20	20 (100)
CHVs trained	20	20 (100)
CHVs delivering the intervention	16	16 (100)
Childcare centre/providers eligible	68	68 (100)
Childcare centre/providers recruited	68	68 (100)
CoP groups	13	13 (100)
CoP group sessions	52 (4 per group)	52 (100)
Centre providers who attended all sessions	68	58
Two follow up visits to each centre provider	136	136 (100)

TABLE 9 Benefits of the intervention on centre provider and CHV knowledge, practices and childcare quality.

Outcomes	Crude analysis		Adjusted analysis	
	Effect size	95% CI	Effect size	95% CI
Centre provider KAP ^a				
Pre-intervention	Ref.		Ref.	
Post-intervention	0.52**	[0.17, 0.86]	0.47**	[0.14, 0.80]
Observations ^c	116		116	
Quality of childcare centre ^a				
Pre-intervention	Ref.		Ref.	
Post-intervention	0.55**	[0.19, 0.91]	0.56**	[0.19, 0.92]
Observations	116		116	
CHV KAP ^b				
Pre-intervention	Ref.		Ref.	
Post-intervention	0.52	[−0.03, 1.07]	0.31	[−0.51, 1.13]
Observations ^d	34		34	

Reporting effect size and 95% confidence intervals in brackets. * $p < 0.05$; ** $p < 0.01$.

^aIn the adjusted analysis, the model was adjusted for: type of centre (home-based, centre-based, faith-based), centre provider age (years), centre provider highest education (primary, secondary, tertiary), location of the childcare centre (Korogocho, Viwandani), period of operation (years), and centre provider ECD training (yes, no).

^bIn the adjusted analysis, the model was adjusted for: CHV age (years), CHV sex (female, male), CHV highest education level (primary, secondary, tertiary), and CHV area of operation (Korogocho, Viwandani).

^cObservations represent the number observed at baseline ($n = 58$) and at endline ($n = 58$), totalling to 116 centre providers/childcare centres.

^dObservations represent the number observed at baseline ($n = 17$) and at endline ($n = 17$), totalling to 34 CHVs.

KSh 133,079 (USD 1,214), KSh 178,408 (USD 1,627)], and KSh 616 (USD 6) for administration. The estimated opportunity costs of the CHVs were KSh 28,636 (USD 261) for attending training, KSh 13,662 (USD 125) for CoP sessions [IQR KSh 13,138 (USD 120), KSh 17,622 (USD 161)], KSh 4,048 (USD 37) for follow-up visits [IQR KSh 2,705 (USD 25), KSh 5,409 (USD 49)], and KSh 530 (USD 5) for administration.

The total explicit costs were KSh 2,477,600 (USD 22,598) and the total opportunity costs were KSh 398,159 (USD 3,632) [IQR KSh 391,432 (USD 3,570), KSh 443,949 (USD 4,049)].

Benefits of the CoP intervention on the centre provider and CHV KAP, and centre quality

Within this feasibility study, we also measured the potential benefits of the intervention on the key outcomes, i.e., centre quality,

and the knowledge and practices of both CHVs and centre providers. As shown in [Tables 5–7](#) there were generally improvements in centre provider KAP, CHV KAP and centre quality scores from baseline to endline.

As shown in [Table 6](#), between baseline and endline, centre provider KAP score improved from 72% to 77% ($p = 0.005$). Crude and adjusted analyses revealed a significant positive effect of the intervention on centre providers' knowledge and practices ([Table 9](#)). Without adding the confounders (unadjusted analysis), the centre providers' mean KAP score was 0.52 standard deviations (SD) higher at post-intervention than at pre-intervention (effect size = 0.52; 95% CI: 0.17, 0.86). After adjusting for the other factors including type of centre, centre provider age, centre provider highest education, location of the childcare centre, period of operation, and centre provider ECD training, the mean centre providers' KAP score at post-intervention was 0.47 SD higher than that at pre-intervention (effect size = 0.47; 95% CI: 0.14, 0.80). This implies that the CoP intervention significantly improved centre providers' knowledge and practice. As was shown in

Table 5, there was a significant benefits of the intervention on the quality of childcare centre quality overall score from 59% at baseline to 66% at endline ($p = 0.002$). Without adjusting for confounders, the mean quality score following 5 months' implementation of the intervention was 0.55 SD higher than at pre-intervention (effect size = 0.55; 95% CI: 0.19, 0.91). Adjusting for the same confounders mentioned above, the mean quality of childcare score was 0.56 SD higher at post-intervention than at pre-intervention (effect size = 0.56; 95% CI: 0.19, 0.92). In other words, the CoP intervention significantly improved the quality of childcare centres. The CoP intervention did not have a significant effect on knowledge and practices of the CHVs (baseline overall score = 100 vs. endline overall score 96.1; $p = 0.164$). Of the eight domains, only one showed a significant (positive) change, i.e., providing support supervision domain (from 78% to 94%; $p = 0.002$) (**Table 7**). There was no significant change in overall score in either the unadjusted or adjusted analyses (**Table 9**).

Qualitative findings

The qualitative findings contributed to our understanding of changes in knowledge and practices in relation to the four main topics of the intervention. **Table 10** below shows the level of agreement, discordance and silence across the quantitative and qualitative data.

In addition to the insights on the impacts of the training and CoP sessions on the four areas of learning through play, safety, health and business management, the qualitative data provided further insights on the implementation and impact of the intervention. These included: (i) the influence of the slum context; (ii) the changing roles of CHVs, childcare centres and providers and; (iii) the need to extend the reach of the intervention. Quotes relating to these themes are provided in the **Annex** section.

Struggling to improve within the context of informal settlements

Despite the improvements highlighted in both the questionnaire and the qualitative findings, the context of the informal settlements continually undermined the ability of childcare centre providers to implement their new skills and improve their practice. This was seen across the areas covered in the CoP sessions. For example, while there was convergent evidence across qualitative respondents and quantitative results regarding nutrition knowledge and practices, the economic challenges facing families and providers undermined the possibility of adding additional fruit, vegetables and greater variety of food in the centres.

The quantitative findings indicated how the centre providers, particularly those running home-based centres learnt how to manage the finances and running of their centres. Others however, explained how the business training had helped them to decide on a fee scale that would cover their costs, although they felt unable to increase the price for existing parents, who were already struggling to pay the existing charges. This may explain why none of the parents interviewed complained of fee increases. While parents were still unhappy at the poor physical structures of the childcare centres, both providers and parents shared examples of centres being reorganised to promote play and providers making and using toys they made themselves from local materials as practiced in the CoP sessions. In a few of the centres, CHVs reported inconsistencies in the centre providers that attended

the sessions. Frequent changes of the centre providers or assistants interfered with the content that was given to the providers, and the overall benefit (knowledge and skills improvement) in that particular centre. So the CHVs felt that such childcare centres did not fully benefit from the sessions because different centre providers were trained on different sessions.

Changing roles for CHVs, childcare centres and providers

While all the CHV's had been active in their communities, many explained how systematically visiting childcare centres and supporting them to improve child health and development had not been part of their previous routine work. All CHVs interviewed expressed their enthusiasm for the new role. This change in the role of CHVs clearly took a while to become established and accepted by the childcare providers, particularly those in home-based centres who were not used to receiving any support, as shown in the quantitative results. The observations of the CoP sessions and the interviews with providers highlighted their enthusiasm for the knowledge and skills that they gained throughout the intervention. Parents were frequently encouraged by the increased competency of the childcare providers and several commented on ways that they could be further trained and supported. This was particularly true in relation to health, both in the provision of medicines for minor illnesses by the providers themselves or by taking the child to hospital if needed. Parents frequently talked about the challenges they faced in accessing health care for their children due to their long working hours and long commute journeys. Many felt that the childcare centres could usefully become a point of access for child health programs including immunizations.

Acceptability and the need to extend the reach of the programme

The high number of private and informal childcare centres within the slums and the ease with which inexperienced providers can open a centre was recognised by all participant groups. CHVs were enthusiastic about the project and felt that CHVs in other areas could be trained to deliver the programme in their own catchment areas as part of their routine activities which further indicated acceptability of the intervention.

Discussion

The current study aimed to evaluate the feasibility acceptability, cost and potential benefits of a community of practice (CoP) model for improving the quality of informal childcare services in two informal settlements in Nairobi. Quantitative and qualitative findings revealed strong indicators of feasibility and acceptability of the intervention among various stakeholders including parents, CHVs, centre providers, policy makers at the National, County and sub-county level in health and education sectors. The findings clearly show that it is feasible to train CHVs to deliver training and support supervision of centre providers on provision of quality childcare services when the content is tailored to their level of education and embedded in their routine work. The data also show a potential for the intervention to improve centre provider knowledge and practices, and the quality of the childcare centre environment.

TABLE 10 Meta inferences by intervention domain.

	Quantitative: significant improvements	Qualitative: findings from interviews, focus groups, observations across all respondents	Meta-inference
(i) Learning through play.	Increases in the proportion of centres with toys for children to play with, driven by home-based centre improvements. Remained similar in small centres and faith-based organisations.	Providers and parents gave examples of centres promoting play and providers making and using toys made from local materials as shown during CoP meetings.	Confirmatory findings: although providers felt the need for more toys and guidance.
(ii) Safety and security, child safeguarding.	Overall improvement in child protection, safety, abuse and positive discipline, driven by improvements in home-based centres.	Limited information in the qualitative data.	Silence: respondents in the qualitative methods did not identify child safety and security as a particular area of change
(iii) Essential child health, sanitation, hygiene and nutrition	<p>a) Health: Improvements in knowledge of immunisation schedule, driven by home-based centres.</p> <p>b) Hygiene: Limited change in hygiene practices.</p> <p>c) Nutrition: Increases in the proportion of centres overall serving hot food, driven by home-based centres.</p>	<p>a) In addition to knowledge of immunisation, parents, providers and CHVs mentioned greater knowledge among providers on responding to a sick child.</p> <p><i>“Immunization you know when you take your child to her childcare you – I have told you she writes down your name and phone number and your partner if you have one and the child’s name and the age, so she can know if the child has completed their immunization or not. If the child has completed, she doesn’t follow up but if not yet immunized she reminds you, this child is this age he/she needs to be taken for this immunization.”</i> (Parent 008-Viwandani)</p> <p><i>“if they [centre-providers] realise that a child health is not good they refer them or they call me to refer them and things like these, and they also have some skills in case the child feel sick suddenly they leave their work and know how they will help the child to get to the hospital.”</i> (CHV 001-Viwandani)</p> <p><i>“Mine [child] got sick and when she [centre provider] saw the child isn’t well, she called me and told me that she[child] was sleeping and she was complaining of a headache. She [centre provider] asked if I have any medicine I can bring. I told her I didn’t have medicine, and that it’s better I come and take her to the hospital. So, she knows how to look after the children she can know a child who has a problem or not.”</i> (Parent 010-Korogocho)</p> <p>b) Implementation of handwashing with soap observed in some centres: <i>“I have seen a difference in how the children are washing their hands there; it’s not like how you would take your child to wash their hands so they can go back to eat. I saw that she has put equipment for children to wash their hands with soap.”</i> (Parent 002-Viwandani)</p> <p>c) Participants reported how providers now emphasised the need for a balanced diet, with vegetables and fruit. <i>“You find they [centre providers] tell the parents to buy various fruits for the children. So, you find oranges, bananas in this childcare centre and they weren’t there [before].”</i> (CHV 010-Viwandani)</p> <p><i>“I have seen there are some changes because before I was taking my child maybe with porridge, food but not fruits because sometimes I would not be able to afford fruits and she asked me when I went to pick up my child, she told me that it is good to mix food and some fruits for the child even if I’m struggling.”</i> (Parent 008-Viwandani)</p>	<p>a) Agreement and extension: qualitative data highlighted greater knowledge and response to sick children. This may not have been identified in the questionnaire due to limited incidence of child sickness.</p> <p>b) Discordance: questionnaire did not confirm qualitative responses on improved hygiene.</p> <p>c) Discordance: qualitative data was silent on hot food. Questionnaire did not capture the resource challenges in implementing nutritional changes.</p>
(iv) Business management	Improvements in registration, policies, finance tracking and budgeting overall, driven by home-based centres.	Centre providers valued business training and tracking expenditure, leading to a recalibration of fees for some. Providers and CHVs emphasised difficulties in collecting fees and manage their business when parents are struggling financially, working long and unpredictable hours.	Confirmation with caveats: while business management skills improved following the intervention, implementing regular fee collection and ensuring fees cover expenditure is extremely challenging within the informal work context of these families.

The feasibility and acceptability of the CoP intervention is attributed to the community participatory approach that was used from the co-design stage, through implementation to evaluation of the model. We involved government representatives, non-government stakeholders (e.g., Kidogo), and the local community (CHVs, centre providers and parents) first to identify the gaps in quality, the issues facing informal childcare and ideas on how they can be addressed. We jointly co-designed the model and CHVs were identified to deliver it. We noted and applied the learning during the implementation and at the end, we jointly refined the model and put together a manual describing the content and its delivery. Participating in and contributing to the development and implementation of the intervention promoted buy-in and sense of ownership among various stakeholders, and made it easy for the research team to obtain genuine feedback on how the intervention can be optimized. Community involvement in health programmes has far reaching benefits in promoting community programmes (37–40) and for the CoP intervention, it will enable full integration, sustainability and transition to scale planned in the future.

The success of CHV and centre provider training sessions was majorly a result of how they were administered – spacing the topics a month apart to allow internalization and application, but also utilizing the interactive approach and taking into account the low literacy and socio-economic levels of both the CHVs and centre providers. Administering the sessions in the local language and use of simple tools made the sessions easy to administer and follow up to be done.

It is important to note also that effective engagement of CHVs in community programmes requires that they are incentivized. In this study, CHVs were given transport reimbursement and a day's allowance whenever they engaged in the programme activities. Despite that it was a small allowance it contributed significantly to their motivation and willingness to deliver the intervention. The role of community health workers or volunteers in supporting health care programmes in communities is increasingly being recognized. There has been a lot of debate on how CHVs can be fairly remunerated for the work they do and how they can be motivated to continue supporting community initiatives. Our findings are consistent with those from other low income settings where incentives including transport reimbursement, recognitions and stipends resulted in significant motivation for CHVs to support community health programmes (41, 42). In Kenya, for example, transport was considered more incentivizing than tools of trade and the monthly stipend. Specifically, CHVs preferred job incentives that offered higher monthly stipends, and recognition at community level over award mechanisms for the best performing CHVs (42). On the contrary, in Indonesia, CHVs were happy with a small monthly financial benefit and were more motivated by enhanced methods of performance feedback, training and considerations for their rights and responsibilities. These and other contextually appropriate incentives may need to be considered when integrating the CoP intervention into CHVs' routine work for optimum delivery (41).

We leveraged on the existing infrastructure, particularly the CHV system to deliver the programme. The CHVs were supported and supervised by the community health assistants (CHAs) and nutritionists as was the practice within the community health strategy at no extra cost, apart from the transport reimbursement when CHAs attended meetings. Costing data revealed that the explicit cost of the entire intervention was 22,589 USD, of which 41% (9,181 USD) were

allowances paid to CHVs and CHAs for training and intervention activities. In contrast, the estimated opportunity cost of time of CHVs and CHAs were only 3,632 USD. It poses questions for decision makers to consider: is the incentive sustainable outside of the study setting, given the budget? For scale-up of the CoP intervention and its integration into the routine practice, a balance must be struck in the long run, between reduced or even removal of incentives and increased basic salary for CHVs. At the higher level, decision makers at the national and County level (Ministry of Health, and Education) were continually consulted and their approval to use the sub-county teams to deliver the programme was obtained. Imbedding the intervention in the existing system made implementation cheaper and easier and hence contributed to its feasibility. Research has shown that successful community programmes are those that have utilized existing infrastructure (43). The integrated approach promoted ownership, enabled resource mobilization, minimized costs of delivery, and to some extent provided initial capacity which are altogether critical for the sustainability of the programme in a resource limited health system. The delivery approach used in this study meets the recommendations that any integrated service delivery model should be developed after a formative research conducted with the users, the providers, and the existing physical and functional system for providing the service; and that it should be planned through a participatory process with involvement of all cadres of stakeholders including senior health officials and bureaucrats at the top to the end users at the bottom (43). The team of centre providers, CHVs, and their supervisors provide a critical capacity (champions) to cascade the acquired knowledge and practices to the rest of the community and to therefore enable implementation to scale. The intervention has the advantage to be adopted to other settings that have the CHV system or its equivalent.

In addition to the evidence on the acceptability and feasibility of the CoP intervention, our findings (both quantitative and qualitative) also indicate a potential of the intervention to improve the knowledge and practices of centre providers as well as the quality of the centre environment. It is important to note that home-based centres had the worst level of quality, and these appeared to be a major driver of mean score on quality. Home-based centres which characterised the majority of centres in Korogocho, showed marked improvements in quality after the intervention revealing a differential benefit of the intervention for this type of centres. The obvious explanation is that the majority of these were of poorer quality at the start and were not receiving any form of support or training prior to the intervention and hence they need this training most. The finding indicates that future interventions should prioritise home-based centres. Absence of changes in CHVs' knowledge scores was most likely because they already had sufficient knowledge at baseline and therefore there was limited window for a significant change attributable to the training.

It should be noted that this was a feasibility study for which sample size was not powered to measure effects of the intervention, however, the fact that it shows indicators for the benefits points to its potential to improve childcare in informal settlements. Full impact of the intervention can be established using larger studies with well powered sample sizes and longer follow up.

It should be noted that, while formal, well-equipped centre-based care with appropriate facilities and adequate numbers of ECD-trained staff may be seen as the ideal, without major investment and subsidization, such provision within informal settlements is unlikely,

particularly in the short-term. There is increasing recognition of the dynamism and entrepreneurial spirit found within informal settlements, challenging a rethink of simplistic dichotomies where the 'informal' is seen as wholly negative and in contrast to formal services (44). This came out clearly through discussions with the different stakeholders. Supporting and enhancing these community-based informal childcare centres through a model like this one, offers opportunities for not only improving child-health, ECD and the livelihoods of working parents, but also building economic opportunities for childcare providers and potentially strengthening social capital within the often transient informal settlements. Due to rapid urbanization, women in urban informal settings work outside the home frequently for long-hours and in unstable informal jobs. They no longer have the support of the extended family that they may have relied on in rural areas to provide care for their children. With an estimated 89%–95% of women working in the informal sector in in Sub-Saharan Africa (45), there is an urgent need for childcare solutions for these women (46). The CoP model therefore provides a promising solution to the challenges faced by urban-poor families in providing a safe, nurturing and healthy environment for their under-5 children.

In conclusion, it can be very challenging for providers to improve their centres within the context of informal settlements. However, change is possible, particularly for the least supported and poor quality home-based centres. This highlights the potential of an affordable intervention, grounded within the existing public community health system to improve the quality of childcare centres, holding out the hope for improvements in child health and development outcomes. The current study provides insightful evidence on how a participatory approach can be effectively used to design and deliver an intervention to improve informal childcare services in a resource limited setting. To our knowledge, this model is the first of its kind and its potential lies in the co-design, community involvement and integration approach that was used in its development and delivery. The evidence on its feasibility and acceptability from the community as well as the indicators for potential impact provide a promise for an impact evaluation study including its benefits for child outcomes which will in turn inform further evaluation of its impact at scale. It would be useful for future studies to explore a multi-sectoral approach to implementation of the intervention by strengthening the links with similar initiatives across sectors to avoid parallel systems but also to ensure sustained funding. The implementation manual, detailing the topics and delivery, is a valuable product that can be used to support wider implementation in Kenya and could be adopted or adapted to other low income settings. Future studies exploring and addressing the barriers to regulation and licensing of informal childcare centres are needed since it was clear from the data that the majority of the childcare were neither registered/licensed nor receiving any support from the government. Lack of clarity of the regulations as well as unachievable expected standards and high fees are major barriers to registration of informal childcare centres.

Limitations

While we had to collect some data virtually, this may have limited the depth of discussion and reflections. We attempted to mitigate

these limitations by doing spot checks by going back to randomly selected households that were interviewed by the field team and asking a sample of the questions to compare the agreement of the responses.

There are very large variations in the quality scores according to the type of centre at baseline and some scores (e.g., within faith-based centres) decrease between baseline and endline. It is not clear why but it might be that centre providers focused on certain areas at the cost of other aspects. The variations probably had some implications to overall findings presented.

The current study primarily aimed to assess the feasibility of a co-designed CoP model, but not powered to assess impact on centre provider KAP or quality of environment, or child outcomes. Hence the data reported here only provide an indication for possible benefit of the intervention. For the same reason, we costed the intervention however, it would not be appropriate to examine cost effectiveness without robust effects data in terms of improvement of quality or child outcomes (not measured). Future studies designed to rigorously evaluate impact on centre quality and child outcomes as well as cost effectiveness are underway.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Amref Health Africa's Ethics and Scientific Review Committee ESRC, Kenya (Ref: P7802020 on April 20, 2020) and from the University of York (Ref: HSRGC March 20, 2020). The participants provided their written informed consent to participate in this study.

Author contributions

MN co-led the acquisition of funding, conceptualization, investigation, and methodology, led the preparation of the manuscript, project administration and supervision, and participated in data curation and formal analysis, review and editing of the manuscript. NL led data analysis and curation, and participated in project administration, and editing of the manuscript. LO participated in the project administration, data curation, formal analysis, and writing. KO participated in the conceptualization of the investigation and methodology of the study, project administration, data curation, formal analysis, and writing. PA participated in project administration, data visualization, and editing of the manuscript. RM, SH, and MK participated in project administration, data visualization, and writing. AR and MA-O participated in project administration, data curation and visualization, and writing of the manuscript. PK-W participated in the conceptualization, investigation and methodology, project administration, data curation and

visualization, and writing. EK-M contributed to the design and supported the administration of the project, and writing. HE led funding acquisition, conceptualization, investigation, and methodology, co-led project administration and supervision, and formal analysis and manuscript writing. All authors contributed to the article and approved the submitted version.

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Conflict of interest

SH and MK were employed by Kidogo Innovations, Nairobi, Kenya.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2023.1194978/full#supplementary-material>

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ANNEX Selected quotes relating to the themes in the qualitative results

Struggling to improve within the context of informal settlements

On the side of food, when I was doing my assessment, I saw that people are still in down... some day-care centres were getting rice but it is just pure white rice which is not mixed with anything and it is just very dry. You see that is the rice they are eating and when I engage her she tells me that is what they can afford. (CHV 007-Korogocho)

Like the ones who are joining now, you know the ones I had before I can't charge them more, like now how we have agreed as daycare providers is we should charge the ones joining more. (Provider 010-Viwandani)

Some don't pay. They bring a child and they say they will pay you. [But] they run away and go somewhere else ...they bring a child without food and you can't stay with that child without food, you will have to use your money to buy that child food or you give them what you are eating because so many do this. (CHV 004 – Viwandani)

Even the playing items for children; we didn't have them before, we didn't know we can find them around and they are important because we couldn't afford to buy them but after the training now, we made ours from what we can find and now they play with them. (Provider 008-Korogocho)

We did not have play materials; in fact, we did not even know the importance of play as part of learning. But we were sown to make play materials from available things like tissue rolls. But if we can get more, it can be good because the children will not be fighting for the few that we make. Each child will have a toy to play with. (Centre provider Viwandani)

It was hard at first because you know, let's say I have a childcare and I don't have someone else to leave with these children and I am coming for the session. So, you see she is wondering how she will leave these children and go to a session. So, it was a little hard but after a while they started getting someone to sit in but they also had stress because if a centre provider is used to this child, the one she has left may not understand the mood of the child and feeding such a child for example becomes difficult. (CHV 004-Viwandani)

Another challenge that I faced in one childcare is that the provider loves changing the teachers, so you were training a certain person then the next day another, so that is a challenge, but it only happened in one childcare. (CHV001 – Viwandani)

Changing roles for CHVs, childcare centres and providers

Before I was going every month as I had told you and I wasn't visiting all of them before we started this project. But nowadays I have to set aside a day to visit my childcares one by one as I know this has this problem and we solve this issue. (CHV 002-Viwandani)

Those childcare centre providers when I went to talk to them, they were scared because they were wondering who these people are. We explained to them and told them that these people are in the community and they are coming to enlarge their training on ECD. They just said it was okay although the turn up was not good on the first day but the second day they came in a good number. (CHV 005-Viwandani)

The first aid training was very good. They even demonstrated for us. They taught us how to handle cases that we didn't know how to deal with. They empowered us very much. We can do very well if we can be provided with full first aid kits. (Centre provider 009-Korogocho)

You find so many people here and if you get a job in a company, you even forget to take your child to the clinic. [If] the children could be immunized in the centre because this will save time for the parents who are busy at work. (Parent 008-Viwandani)

The need to extend the reach of the programme

Now you can't find anyone employing a house help or a child who is being left with a neighbour... When you take your child there [supported childcare centres] you will feel safe so, it would be good if the childcares left out could be included so they can get what the others got. (CHV 002-Viwandani)

So my humble appeal is that if it is possible it can be rolled out to even the other childcare centres that were not included. (CHV 007-Korogocho)

It is a good idea since there are some who are starting these baby cares and they don't have the skills. You get they leave the children to get cold but when they have this information on how to take care of children at least when we go to work as parents, we will feel our children are in safe hands. So, it is good to empower them how to take care of children. (Parent CP005-Korogocho)



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Informal settlements and the care of children 0–3 years of age: a qualitative study

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Background: There is a rapid increase in urbanization with a high percentage of people living in poverty in urban informal settlements. These families, including single parents, are requiring accessible and affordable childcare. In Mlolongo, an informal settlement in Machakos County in Nairobi metropolitan area, Kenya, childcare centres, referred to as 'babycare' are increasing in number. They are being provided by local community members without attention to standards or quality control. The study objective was to understand parents', caregivers' and community elders' experiences and perceptions in terms of the quality of babycare in Mlolongo to inform the design and implementation of improved early childcare services.

Methods: Using a community-based participatory research philosophy, a qualitative study including focus group discussions with parents, community elders and babycare centre employees/owners (referred to as caregivers) was conducted in Mlolongo.

Results: A total of 13 caregivers, 13 parents of children attending babycare, and eight community elders participated in the focus groups. Overall, community elders, parents and caregivers felt that the babycare were not providing an appropriate quality of childcare. The reported issues included lack of training and resources for caregivers, miscommunication between parents and caregivers on expectations and inappropriate child to caregiver ratio.

Conclusion: The deficiencies identified by respondents indicate a need for improved quality of affordable childcare to support early child development in these settings. Efforts need to be invested in defining effective models of early childcare that can meet the expectations and needs of parents and caregivers and address the major challenges in childcare quality identified in this study.

KEYWORDS

babycare, child care, early child care, resource poor environments, informal urban settlements, Kenya, low- and middle income country

Introduction

The environment in which a child grows, plays, and receives care is vital to fostering its developmental potential (1). With rapid urbanization occurring globally, more working families are requiring accessible, affordable childcare (2). Parents in poor urban informal settlements are particularly challenged given their separation from the extended rural family and the severe financial constraints, the lack of trained childcare caretakers, poor infrastructure and hygiene situation, and security issues in these areas. Innovative intervention strategies that support safe, nurturing and quality childcare in these low-resource settings are necessary to enable parents to go out of their homes to work and provide for their family while simultaneously being sure that their children are well taken care of and receive a sound foundation for their development.

The United Nations Sustainable Development Goal 4.2 aims to ensure that all children have “access to quality early childhood development, care and pre-primary education, in preparation for primary education by 2030,” (3). The aim is to ensure all children around the world have equal access to affordable childcare. The implementation and expansion of childcare programs has been reported as insufficient to reach this goal, both in the absolute number and the quality of childcare centres. To achieve this goal, an equity-based approach to achieve universal childcare should be applied, where the quality of childcare is measured from an ecological perspective (4). Quality of childcare programs can be achieved through the design, curriculum, training for childcare workers, monitoring and assessment of programs, and appropriate governance and supervision (5).

Kenya and the state of childcare in urban informal settlements

Kenya has been ranked as a lower middle-income country since 2014 (6) with a rapid urbanization reaching 28.5% in 2021 (7). Approximately 22% of the residents in Kenya's capital city Nairobi live in severe poverty with 60–70% of city dwellers (about 2.5 million) living in some 200 informal settlements (8). Most families and individuals in these resource-poor communities lack access to essential services such as water and sanitation, health services, quality education, social services, and economic empowerment.

With an increasing majority of Africa's populations living in urban settings, financial constraints, poor housing conditions, and lack of infrastructure can all significantly impact young children's long-term development. The challenge is finding workable models to provide affordable and developmentally supportive care for these children.

There are a number of different childcare options in Kenya, ranging from formal care (e.g., private nurseries and child care centres) to informal care (e.g., siblings, grandparents and other family members) (9). UNESCO stated “the care and education of young children under three in Kenya is largely in the hands of older siblings, grandparents and house help, if they are available” (10). However, traditional extended family members may not be available to support childcare especially for young families migrating from their rural homes to cities like Nairobi. At the time of the study many mothers lacked maternity leave benefits, or at best, received only the

government mandated 12 weeks (11, 12), and therefore needed appropriate childcare options when they returned to work.

For children over 3 years of age, the Kenyan government introduced free pre-primary education at developmental care centres. However, the “Education Sector Strategic Plan and Implementation Matrices” (Kenya, 2003–2007) was not implemented as planned resulting in the private sector taking over childcare provision (9). Most recently, there has been a shift to group childcare in the form of “care centres” due to the high costs and perceived problems with nannies in private homes (9). There is little known about the quality of these centres and there is limited knowledge about the number of childcare workers in Kenya and their standards of practice (13). Studies that exist have revealed poor hygiene, poor feeding, and varying degrees of quality across sites (14). The lack of standards in childcare centres and large inconsistency in resources and staff training is problematic. This puts enrolled children at risk of compromised developmental potential due to poor quality of care and safety standards.

Nairobi's informal settlements have continued to brim with economic migrant families, often necessitating that mothers and older children seek employment outside their homes, leaving younger children in need of appropriate childcare options. In these areas, single mothers experience ‘elevated stress’ with little financial support by the fathers and the comparatively weak social support available in these precarious urban environments (15). A study in an urban informal settlement in Nairobi showed that “mothers employ three main strategies to balance their work and child care responsibilities: (1) combine work and childcare, (2) rely on kin and neighbors, or (3) use centre-based care” (16).

Mlolongo County and early childcare

Mlolongo, is a city in Machakos County, and part of the Nairobi metropolitan area situated about 14 kilometers from Nairobi. The Nairobi to Mombasa highway traversing the Mlolongo mid-stream is the commonest feature here. At the time of the study the population of Mlolongo was estimated to be 100,000 (17) and children 0–4 years of age represented 7.8% of the Kenyan population (18). It is a densely populated area with more than 40 Kenyan tribes represented, including other nationals from East Africa and beyond. Being part of the sub-urban areas around Nairobi, the languages spoken here are national. Most residents are day laborers, small business owners, employees of local businesses, cleaners, and housemaids in households in richer areas and street vendors.

In the informal settlement of Mlolongo, specific information about childcare is scarce. The Orphans and Vulnerable Children (OVC) project was the first one of its kind in Mlolongo supporting childcare until 2012. The OVC staff carried out some informal unpublished assessments of the so called private “babycare” in the area (17). The assessments revealed that centre-based childcare was available in a variety of options ranging from childcare centres organized by non-government organizations to unofficial ‘babycare’ run by informal settlement dwellers and local proprietors themselves. Most of centre-based care was fee-based and larger centres with trained staff were often not affordable for the parents in these areas.

The babycare industry in Mlolongo was relatively new and grew quickly to meet the demands of the burgeoning population, with little

or no oversight, training, or support. Babycare were independently established by individual community members and proprietors with no training in child development or in entrepreneurship. At the time of the study, Mlolongo had 70 private small enterprise babycare taking care of approximately 1,400 children of age 3–36 months (19). An average of 22 children were found in a babycare with an average of 15 children per caregiver. Parents (often single mothers) would drop off their young children in the early morning prior to leaving for their own work and pick them up in the evening. Depending on their incomes, they paid fees to the caregivers but often failed to do so. The OVC assessments of the babycare identified profound inadequacy including lack of developmental programming; poor nutrition for the children that had to be provided by the parents; poor hygiene conditions; lack of space; little or no training of caregivers in childcare and thus huge skills gaps in caretaking of the children's basic needs.

In 2012, an informal visit by the researchers to Mlolongo babycare before the start of this research project revealed extremely uncondusive environments and unbearable conditions for the young children taken care of in mostly private babycare (20). Furthermore, the assessment showed poor community understanding of the importance of basic quality in early childcare and lack of childcare standards or regulation with significant variability in practices and resources to support nutrition, development, and play. Financial challenges were observed leading to overcrowding and poor environments, and children were abruptly displaced with unexpected closure of babycare if the owner attained more lucrative employment. However, for a lot of working mothers, the options were either these make-shift daycares or leaving their infant unsafe and unguarded at home alone or with an older sibling who had been pulled out of school.

A follow-up study of 30 mothers with six to 36-months-old children and using Mlolongo babycare revealed that the economic condition of families was dependent on casual labor but was better than in other urban settlements in terms of household stability (two parents), number of children per household and monthly income (19). The study showed that 73% of mothers were married and that there were an average 1.7 children per household and 14,300 Kenya Shillings (KES) average family income. Only 17% of mothers and 33% of fathers had a permanent job. There was a significant economic impact (family lost income) related to child illness, with 4.8 days/month spent with sick children and 76% of mothers who did not go to work if the child was sick, amounting to an average daily income loss of 392 KES.

Aim of the study

This study carried out in 2013 was the first of a series of studies under an implementation research project carried out between 2013 and 2015 to improve childcare for infants and young children in Mlolongo, an informal urban settlement at the outskirts of Kenya's capital city Nairobi. The objective of the study was to understand parents', caregivers', and community elders' perceptions of and experiences with the current quality of babycare in Mlolongo, ensuring that the community is engaged and has a voice in the design to achieve quality affordable and sustainable childcare in their community.

Methods

Design

The study team used a qualitative phenomenological design to obtain an understanding of key stakeholders' perspectives and experiences of babycare centres quality with the intent to co-create solutions to this problem in subsequent phases of the project (22). Parents (consumers), caregivers (providers) and community elders (public beneficiaries) were involved in the design of the interview guide for focus group discussions, participated in focus group discussions (FGDs) and provided feedback on gaps in the current system. Using this approach, the study sought to explore the current knowledge, behaviors and practices pertaining to childcare, and explore existing challenges, through lived experiences of the stakeholders. In this study, a caregiver is defined as an owner or worker of babycare who provides childcare services for parents of infants and young children. Participating parents were defined as community members using the babycare for the care of their children when at work or otherwise busy.

Participant selection and setting

Using purposive sampling, eligible participants for the FGDs were identified by research staff and caregivers and contacted in person at the babycare located within the informal settlements of Mlolongo, Kenya. Prior to recording the FGDs, the moderator explained the details of the focus group content, noted that the discussion would be recorded and transcribed and assured participants that transcription of participant comments would be anonymized. Focus group composition was homogenous, and conducted separately with each stakeholder group (caregivers, parents, and community elders) to maximize the differing perspectives each community group might bring to the understanding of babycare.

Data collection

Aligned to the WHO standards for caregiving, moderators explored the quality of the babycare through a semi-structured interview guide that sought to cover the following topics: (1) current process and operations of babycare, and (2) caregivers' and parents' perception of their roles and responsibilities, the moderator asked questions related to these topics and probed additional questions to get a better understanding of participants' lived experiences working and participating in babycare. The interview guide is presented in [Appendix A](#).

Focus group details

Focus groups were conducted in Kiswahili at a central location in the Mlolongo community for 1 h each, with one moderator and one recorder. The moderator was responsible for engaging all participants encouraging them to share their experiences working or using babycare. Moderators obtained informed consent from participants and ensured participants were aware that participation was voluntary.

The FGDs were audio-recorded, and moderators took field notes during the discussion.

Data management

Transcript recordings were kept on a locked server at the Aga Khan University in Nairobi, and transcriptions were de-identified. During the transcription of focus groups, participants' names and identifying information were not recorded. They were identified only by gender (male or female) and stakeholder (e.g., caregiver, parent, community elder/leader). FGD audio-recordings were transcribed in Kiswahili and translated to English by an experienced interpreter/translator. This was verified by an additional researcher for accuracy.

Analysis

The Consolidated Criteria for Reporting Qualitative (COREQ) research guidelines were followed in reporting the qualitative enquiry (21). An iterative thematic analysis approach was adopted following guidelines from Creswell & Poth (22). All participants took part in one-time FGDs with no long-term commitments for subsequent project involvement. Two analysts first reviewed transcripts from interviews with caregivers, parents, and community elders. A continuous review of interview data informed whether a point of saturation was reached (i.e., no new information was yielded) whereby after each, FGD was completed and transcribed, transcripts were reviewed, and saturation was determined to be reached when themes began to consistently overlap. Using a process of memoing, patterns in the data were identified and initial codes were created inductively. The codes were discussed and classified into themes based on the discussions by the analysis about what was learned about the lived experiences of interviewees about the babycare, aligning with the phenomenological design of the study. Additionally, themes were also identified deductively using codes informed by the WHO standards for child care service (22). The analysts then independently coded the remaining transcripts and reviewed together. Linkages and groupings among themes were discussed to create the final set of themes.

Research team and reflexivity

The research team was made up of individuals from a diverse background of expertise who participated as the moderator in focus groups and analyzed the transcripts. The moderator was a local Kenyan student. The analysis team included a developmental pediatrician, a child health scientist, a graduate student, local senior program advisor in Kenya and professor of pediatrics at Aga Khan University.

Results

Participants

A total of five FGDs were conducted, consisting of six to eight participants per session. The FGDs included: 13 caregivers of

babycare (two FGDs), 13 parents (two FGDs) of children attending babycare, and one group of eight community elders. All caregivers and parents were female, whereas all community elders were male.

Characteristics of caregivers and babycare

To protect the privacy of the participants the names of the centres will not be revealed and only the types of sites will be mentioned in this paper. Caregivers worked at schools and as community health workers. They took care of between 8–18 babies and children at one time. One caregiver took care of fewer than eight babies and children, while the remaining seven took care of greater than 10 babies and/or children. The children they cared for were between 6 months and 3 years old, with workdays beginning between 6 am and 7 am, and ending between 7 pm and 8 pm. Their hours depended on how long each parent left their individual child at the centre. Many of these babycare were reportedly conducted in the caregiver's home and caregivers completed several duties and tasks during this time, which included, but were not limited to (1) feeding the baby, (2) bathing the baby, (3) putting the baby to sleep and (4) some play with the babies. However, the nature of work and the number of babies caregivers cared for in the centres varied.

In response to the following question “How many babies do you have at the babycare,” (Moderator, FDG 1), the following responses were provided:

“I have around 13 babies ranging between 6 months to 3 years. I have 2 caregivers.” (Caregiver 1, FDG2).

“I have around 18 babies ranging between 4 months and two and a half years. I have 2 caregivers.” (Caregiver 2, FDG2).

“30 and [I] am alone,” (Caregiver 2, FDG1).

Characteristics and responsibilities of parents

Thirteen parents (only mothers) participated in two separate focus groups as clients of Mlolongo's babycare. Mothers were all from the same community of Mlolongo. Nine out of 13 of these mothers were working. Two of these mothers worked as caregivers at other babycare, and one mother worked at a boutique. The occupation of the remaining six mothers was not mentioned.

Mothers' roles and responsibilities differed between babycare, but typically parents were expected by the caregiver to bring enough food for the baby throughout the day, and other personal items of the baby. Most of the mothers fed their babies in the morning and dropped them off at babycare between 7 am and 9 am in the morning. Most mothers did not report a specified time at which they picked up children and mothers indicated that there was usually a set fee for the day; one mentioned she gets the baby between 6 pm and 7 pm. Most mothers prepared food for their babies, but, identified that, if there is not enough food for the day, the caregiver would provide food for the baby. Overall, parents expected caregivers to do the following at babycare: (1)

cook and provide food for the baby, (2) play games, (3) put them to sleep, (4) change their diapers and bathe them, (5) administer any medication the baby may require, and (6) fulfill all other needs the baby may have during his/her stay. The cost of babycare was dependent on the caregivers' individual duties and requirements. However, there was no standard pricing for these tasks. Some caregivers would do "additional" work like start earlier than they are scheduled to accommodate parents that attend the babycare early. When caregivers were asked about the tasks they complete and their schedules, their responses included the following:

"I begin baby care by 6.00 am because I do it in my residential house. I clean it well, spread their bed, at 9.00 am I give them milk, change them, put them to sleep, wake them up, change them, feed them, we go out to play, I change them then their parents start picking them from 4.00 pm. The last baby is picked at 8.00 pm. You cannot charge some parents more even if they pick their babies [late] because they are not financially able to pay more," (Caregiver 1, FDG2).

"My baby care starts at 6.00 am but some babies are brought at 5.30 am....," (Caregiver 2, FDG2).

Perception of community leaders

Eight community leaders participated in one focus group discussion. Each elder came from eight different villages in Mlolongo. The villages are not disclosed in this paper to protect the privacy of the community leaders. All community leaders endorsed that babycare were currently functioning at low quality with limited resources. Community leaders felt caregivers needed more training, support, and resources to ensure the safety of the babies who attend the babycare. They expressed their concerns around the differing roles each caregiver plays, making it difficult to understand what caregivers do. They felt parents had varying reasons for using babycare. These included perceptions that parents had low incomes and could not take time off work to care for their child. In addition, babycare were perceived to be a more reliable form of childcare than "house girls," who were usually maids/nannies within the parent's home.

Community Leaders perception of babycare:

"The standard of the baby care is very low so I would opt that food is brought for them" (Elder 2, FDG1).

"Baby care should not be in a small room. A place should be set aside for them like in a church where there is enough space," (Elder 1, FDG1).

Community Leader perceptions of why parents use babycare:

"The salary these parents earn is very low. Their income is minimal so they are not in a position to hire a domestic worker so they take them to baby cares that they can afford to pay." (Elder 1, FDG1).

"Domestic workers are untrustworthy so some parents fear for example they [cannot] leave the baby alone in the house and go away." (Elder 3, FDG1).

Themes

Three major themes emerged around the quality of babycare in Mlolongo informal settlement. See Table 1 for a summary of major themes and subthemes identified in this study.

Theme 1: Babycare play a role in addressing issues experienced by parents when providing childcare.

- There is tremendous need for babycare in the Mlolongo community.

Mothers undergo an immense amount of stress and pressure after their child is born, given the regulated maternity leave available. At the time of the study mothers were limited to 12 weeks of maternity leave. Babycare are sought to help with issues experienced by parents when raising their child related to the socioeconomic status and personal characteristics of the parent. The factors resulting in the need for babycare were reported from the perception of parents, caregivers, and community leaders. While parents focused more on their nature of employment and income, caregivers and community leaders attributed use of babycare to the mother's employment and maternal stress. In addition, babycare were seen as highly accessible due to proximity to clients' homes or workplaces.

- Maternal low-income and nature of employment prevents the ability to take time off from work.

Many mothers in this study who were engaged in low-income employment were unable to take time off to care for their baby, and,

TABLE 1 Major themes and subthemes identified on quality of babycare in Mlolongo, Kenya.

Major Themes	Subthemes
Babycare play a role in addressing issues experienced by parents when providing childcare	<ul style="list-style-type: none"> • Maternal low-income and nature of employment prevents the ability to take time off from work. • Nature of employment and income of mothers contribute to the mother's selection of babycare. • Elders and caregivers cite maternal stress, immaturity and nature of parenting as reasons for seeking babycare.
Current quality of babycare and improvements required	<ul style="list-style-type: none"> • Inappropriate babies to caregiver ratio. • Limited space and lack of cleanliness of babycare. • Caregivers not provided with appropriate and continuous training.
Systemic barriers to resolving poor quality and establishing standards	<ul style="list-style-type: none"> • Disconnect and disagreement between parents, caregivers and elders.

as a result, sought affordable childcare options. Some parents owned shops or worked in a private business requiring them to be there for more than 8 h a day.

"I sell in a boutique. I get there at 8:00 am and leave at 7:00 pm," (Parent, FG1).

Parents feel babycare are trustworthy and less expensive than hiring a single babysitter or caregiver to watch their child at their house. These individuals are called "house girls," who come over to the parents' house and watch the child while the parent is away. Parents report that this option has now become expensive and, at times, unreliable for parents. One parent said:

"I would say babycare is the best, since nowadays hiring a house girl is such an expense. For example, I had a house girl who burnt my baby, so staying at the hospital with the baby was expensive." (Parent, FG1).

The elders also agree with the parents' perception of babycare being more affordable than other childcare centres.

"The salary these parents earn is very low. Their income is minimal so they are not able to hire a domestic worker so they take them to babycare that they can afford to pay." (Elder, FG1).

Elders in the community agree with parents and babycare centre caregivers on the benefits of babycare in helping parents who may not be able to be with their baby due to work.

"The parent can easily fend for the baby because she has a person, she can leave her baby with. The baby gets mother's love even in the absence of their real mother," (Elder, FG1).

- Nature of employment and income of mothers contribute to a mother's selection of babycare.

Parents reported several considerations before they opted to use babycare centres. These considerations also determined the type of babycare they chose, suggesting most parents have their own set of standards they expect babycare to meet. Four out of five mothers reported the primary reason for taking their child to a babycare was because they were currently employed at jobs that took up most of their day, typically from 8:00 am – 6:00 pm. They all highlighted that being away from their baby during the day required securing external help to care for their child. While some mothers felt that babycare centres were a less expensive option for providing care for their child while they were away, other mothers suggested that hiring a house girl was a potential alternative for flexibility. Some mothers reported the benefits to hiring a house girl, being able to stay longer at work and reduced amount of stress getting their child ready to drop off at babycare. However, mothers did indicate that they were more drawn to babycare because they were more affordable. Mothers reported if they opted to take their child to babycare over hiring a house girl, they expected the babycare to meet a number of criteria.

One parent said the following when choosing a babycare centre:

"Some of us, we consider cleanliness. You compare different babycare and in case you discover one does not change nappies, which can cause nappy rash, you be very careful. A congested place is also not conducive for the baby." (Parent, FG2).

When asked about how much the cost of a babycare centre influences their decision one mother said.

"There are instances where it does, and it does not. The caregiver can charge fifty shillings and she is clean, while another one charges 100 shillings, but is not as clean as the cheaper one." (Parent, FG2).

This highlights the impact of financial and social situations on expectations and decisions regarding babycare.

The elders felt that the mothers' educational background, and profession may impact their decision to use babycare.

"The nature of work the parents do, for example, others are commercial sex workers, bar maids so instead of locking up the babies they take them to babycare." (Elder, FG1).

Elders and caregivers cite maternal stress, immaturity, and nature of parenting as reasons for seeking babycare.

Caregivers and elders have negative opinions of parents seeking babycare. They feel parents who seek babycare do not want to take responsibility for their child or are disadvantaged and as such are required to work instead of being able to look after their child.

"[We see] irresponsible parenting like drunkenness, so there is no attachment and others are very poor, so busy looking for money, so they just leave the baby at babycare." (Caregiver, FG1).

However, they do realize that babycare are more trustworthy than traditional use of house girls.

"Caregivers are also more mature than these girls, so some people are preferring them," (Caregiver, FG1).

Theme 2: Current standards and quality of babycare and required improvements.

Caregivers, parents and elder's opinions were sought to understand their perceived thoughts about the quality of babycare. These included: (1) inappropriate baby to caregiver ratio, (2) limited space and cleanliness of babycare, (3) lack of appropriate training provided to caregivers, and (4) expected standards and quality of babycare.

- Inappropriate babies to caregiver ratio.

Parents, caregivers working at the babycare and elders highlighted the inappropriate baby to caregiver ratio.

"You find one person taking care of about 15 and 20 babies. We need like 1:5. The small ones need a lot of attention due to crying and changing." (Caregiver, FG1).

"Babies should be separated in accordance to their ages and cared for by different people not one person for all of them." (Elder, FG1).

- Limited space and lack of cleanliness of babycares.

Parents and elders reported babycares to be limited in space and unclean. Babies have also been reported to sleep in uncomfortable environments including on desks and seats. They have reported babies to be susceptible to communicable diseases by sharing spoons and plates.

“There is a risk at babycares because there is no checking on the health status of the baby. Besides HIV, there are also communicable diseases, and these can be very contagious. Measures should be taken to address such issues.” (Caregiver, FG1).

“Sharing spoons and plates should be avoided to curb spread of contagious diseases.” (Parent, FG1).

“The problem I see is that the room is tiny and there are more than 10 children. The babies sleep on the cold floor; hence they do not sleep well since there are no sheets or blankets.” (Elder, FG1).

Caregivers have reported similar concerns about the setting in which they are required to provide care to these babies. In addition to the inappropriate baby to caregiver ratio, they also raise the problem of long hours with workdays ranging in length between 8 and 12 h with few resources, training, and support.

One caregiver described her day stating.

“I begin babycare by 6:00 am because I do it in my residential house. I clean it well, spread their bed, at 9:00 am I give them milk, change them, put them to sleep, wake them up, change them, feed them, we go out to play, I change them, then their parents start picking them from 4:00 pm. The last baby is picked at 8:00 pm. You cannot charge some parents more even if they pick their babies late because they are not financially able to pay more. They play with dolls and run after each other. Those very young ones just eat and sleep; they do not play.” (Caregiver, FG1).

- Caregivers not provided with appropriate and continuous training.

Parents and elders felt some caregivers were not trained to take care of their babies. Furthermore, some expect the caregivers to administer medicine, which they feel they are not adequately trained to do.

“Caregivers need to be trained on caring for babies. and have laid out standards and should have a license. Babies should have a medical record and in case of sickness there should be first aid or a clinic nearby where they can receive treatment.” (Elder, FG1).

“The babies’ temperatures rise frequently hence every other day you take the baby to hospital and are put on medication. There is no medicine for emergency, so the caregiver waits until evening, you take your baby to hospital...She does not know how to give medicine.” (Parent, FG2).

Caregivers reported having varied educational and training backgrounds. This included: (1) Sunday school, (2) mentoring, (3)

seminars, (4) nursing, and (5) Orphaned and Vulnerable Children (OVC) training. The OVC training program was a previously funded program organized by OVC staff and a private donor that were funded by small donations from charities in the US and Mlolongo (23). Caregivers expressed interest in obtaining additional formal training in early child development. They reported learning from each other by visiting each other and sharing ideas and concerns about their practice.

When asked what training caregivers preferred, caregivers listed:

“Professional presentation, ECDE and Child Development” (All caregivers, FDG2).

“Anything new. Knowledge is power.” (Caregiver 1, FDG1).

One caregiver also stated they visit each other at babycares and learn from each other.

“Yes. When we visit each other we enlighten each other and help each other mentally.” (Caregiver 1, FDG2).

- Expected standards and quality of babycares.

Parents and elders felt that babycares should abide by set standards surrounding hygiene, resources and training, such as those outlined: Parent and Elder Perspectives on Babycare Standards.

- Always ensure cleanliness.
- Diapers should be provided by caregivers.
- Food should be prepared on site in babycares.
- Toys to play with for child should be available.
- Trained caregivers should be hired with completed background checks.
- A consistent schedule should be provided of when babycare hours commence and end.

Theme 3: Systemic barriers to resolving poor quality of babycares.

When comparing parents’ and caregivers’ perceptions of babycares, it was evident there was tension and disconnect between caregivers and parents due to conflicting views of a caregiver’s role in the babycares. These issues may present as barriers to resolving poor quality and establishing standards of babycares if not further explored or addressed.

Although parents and caregivers recognize that there is an unfair caregiver to baby ratio, and that babycare centers run for long hours daily, their perception of their roles in providing supports and care for the baby are different which may contribute to conflicts in relation to what caregivers should be trained to do.

Caregivers often cook food for the babies they care for but they felt that parents should be responsible for providing food to their children. In contrast, parents felt the caregiver ought to prepare and serve food. This presents an issue in terms of determining whether caregivers should be trained in appropriate food preparation and safety.

Caregivers stated they had some resources for these children but expected parents to bring toys and items for the baby. Overall, caregivers expressed the need for more resources including toys, mattresses for babies to sleep on, and other personal care items for babies. This conflict would present an issue on who’s responsibility it is to provide resources for babies and children to use.

One parent said:

"I take her with packed food, but, if it got finished, the babycare prepares food, but, before giving the baby, they will ask you if there is a person at home who can bring her food." (Parent, FG1).

Conversely, a caregiver when asked about roles of a parent said:

"Some parents do not clean the lunch boxes well so the food goes bad and you are forced to prepare fresh food." (Caregiver, FDG2).

Notably, some caregivers and parents felt the caregivers had the right to discipline the children, with some parents and caregivers permitting corporal punishment.

"They should be told whatever they are doing is not right. They should be beaten." (Parent, FG2).

While one parent did not agree,

"They should be corrected calmly. You can negotiate with them they do not have to be beaten." (Parent, FG1).

To implement the appropriate standards related to the space of babycare and training, parents and caregivers need to agree on what each of their role is in working and participating in babycare.

Discussion

This study is one of the first of a series of studies aimed at understanding parents', caregivers', and community elders' perspectives of babycare in the urban informal settlement of Mlolongo, Kenya. The results of the study were used to inform the development of community-engaged strategies to improve early childcare in this area. Babycare in Mlolongo were generally of poor quality, did not adhere to recommended standards (24), and lack consistency across centres within the same communities.

Babycare do address barriers families face in securing childcare given their economic and employment situation they face. Personal, financial, and socioeconomic factors play a role in the type of babycare centre parents choose and this is associated with the quality of babycare that develop (25). Parents, caregivers, and elders recognize the existing limitations, support the development of standards, and feel more formalized training of caregivers is required.

However, there is disagreement and conflict between parents and caregivers in relation to expectations of babycare centres and this difference in perception may make it difficult to improve quality and implement standards. These challenges also extend between parents' perceptions and the perceptions of elders and caregivers. Caregivers and elders often cite the mother's ability and time to parent as reasons for problems with babycare while parents cite the lack of training among caregivers and resources at

babycare as a reason for sub-optimal standards. Caregivers felt some parents increased their workload by not preparing food well or picking up their children late.

The differences seen between parents, elders and caregivers is consistent with the literature. Service quality in children is often referred to as a subjective construct where the perception of quality involving the nature of childcare is based on the perceptions and backgrounds of those involved (26). In this case, caregivers perceive parents to contribute to their child in specific ways while parents expect caregivers to perform specific duties. To appropriately address the reported substandard of babycare, this conflict between parents and caregivers needs to be resolved by determining clear roles and responsibilities for each group working and participating in babycare. Also activities to promote a healthy caregiver and parent relationship are required to address any quality issues and the development of standards (25, 27).

In Mlolongo, there is great variability in the caregiver to baby ratio, ranging from eight to 20 babies per caregiver. Caregivers have reported stress in having to manage many babies at the same time and recommended additional personnel to improve the ratio. This continues to be an issue across other informal settlements and the inappropriate ratio is reportedly impacting early child development and quality of care. Current daycare and babycare centre standards recommend one caregiver for every 3-4 children (28).

Resources are inconsistent between babycare, while some may have beds and toys for babies, others require parents to bring these items. Both caregivers and parents agree that current babycare have limited resources and personnel, however, their perceptions of their roles differ. While parents have reported they feel caregivers are responsible for providing food for their children, caregivers expect parents to bring food and sleepwear. Both parents and caregivers recognize that personnel are limited but both groups feel that it is not their responsibility to provide resources or time to address this gap. A transparent understanding of caregivers' and parents' roles is required to ensure that a trustworthy, sustainable relationship is established between caregivers and parents in the community (25, 27).

Meeting standards in resources, cleanliness, and hygiene for babycare are important for healthy early child development. Babies attending babycare are at a higher risk of infectious diseases than those who do not attend babycare (29). The implementation of evidence-based practices into babycare would result in better hygiene practices and healthier food for these children. As such, practice standards can reduce the incidence of illness and improve developmental and nutritional outcomes for children at risk. Babycare and daycare centres are seen as important places for children at risk to make nutritional and developmental gains given the amount of time children spend in these environments (1). As such, standards for babycare should support optimal opportunities for children to have sufficient healthy meals and to have setting supportive of play. This is especially beneficial in urban informal settlements where families have limited resources (30).

In this study, elders, parents, and caregivers agreed on the following standards for babycare; (1) reduced caregiver-to-baby

ratio, (2) sufficient resources and personnel to meet the demands of each babycare centre, (3) transparent agreement between parents' and caregivers' roles at babycare, and (4) appropriate training for caregivers. This level of agreement among key stakeholders provides the foundation for community development of standards and improvement in quality. The findings are consistent with a previous study looking at babycare in Nairobi, Kenya (14).

There were limitations to this study. The study used purposive sampling which may have introduced bias in the findings. Views of those unable to attend may have been missed. However, the views between those who did attend were consistent. Also, some parents were also caregivers working in babycare and this may have influenced their perceptions.

This was one of the first studies to explore the perceptions of key stakeholders - caregivers, parents, and elders - on the current quality of babycare in informal community settings. These settings are important given the existing and increasing number of children living in informal communities associated with urbanization. Investment in community-supported standard setting, quality improvement strategies and monitoring in relation to standards is supported by community stakeholders. Quality childcare resources invested in these communities can have significant positive outcomes for vulnerable children who are exposed to multiple risks that impact their health and development.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the AKU Ethics Review Committee. The patients/participants provided their written informed consent to participate in this study.

Author contributions

RM, MM, AY, VS, and RA contributed to the study design. RM, MM, and VS were responsible for the implementation of the study. TJ and RM shared equally the first draft of the paper. All authors contributed to core content and revisions and approved the final paper.

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Conflict of interest

MM and RA are currently partners in the Health Associates GmbH, Germany, a consulting service at the time of publication. They were employed by AKU when the study was carried out. RA is currently Emeritus faculty at AKU. VS is employed by Johnson & Johnson and was on secondment to AKU during the implementation of this study.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2023.1110578/full#supplementary-material>

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Predictors of quality of childcare centers in low-income settings: findings from a cross-sectional study in two Nairobi slums

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Background: Rapid urbanization and increased women's involvement in paid work have contributed to the upsurge of informal childcare centers, especially in low-income settings where quality is a major issue. However, there are limited data on the factors associated with the quality of childcare centers in informal settlements in Africa.

Methods: We conducted a quantitative observation and questionnaire survey of 66 childcare centers to identify the factors associated with the quality of childcare services in two informal settlements (Korogocho and Viwandani) in Nairobi. The quality of the centers (outcome variable) was assessed using a locally developed tool. Data on center characteristics including type, size, location, length of operation, charges, and number of staff were collected. Center providers' knowledge, attitude, and practices (KAP) in childcare were assessed through a questionnaire, focusing on nurturing care and business management. Data were described using means and standard deviation or frequencies and percentages. Associations between quality center score (outcome variable) and other variables were examined using multivariable linear regression to identify potential predictors of the quality of the center environment.

Findings: A total of 129 childcare centers were identified and categorized as home-based ($n=45$), center-based ($n=14$), school-based ($n=61$), and church-based ($n=9$). The number of home-based centers was particularly high in Viwandani ($n=40$; 52%). Only 9% of home-based centers reported any external support and 20% had any training on early childhood development. Of the 129 centers, 66 had complete detailed assessment of predictors of quality reported here. Unadjusted linear regressions revealed associations between quality of childcare center and center providers' education level, type of center, support received, caregiver-child ratio, number of children in the center, and center providers' KAP score ($p<0.05$). However, in the multivariable regression, only higher levels of center provider KAP ($\beta = 0.51$; 95% CI: 0.18, 0.84; $p=0.003$) and center type ($\beta = 8.68$; 95% CI: 2.32, 15.04; $p=0.008$) were significantly associated with center quality score.

Implication: Our results show that center providers' knowledge and practices are a major driver of the quality of childcare centers in informal settlements in Nairobi. Interventions for improving the quality of childcare services in such settings should invest in equipping center providers with the necessary knowledge and skills through training and supportive supervision.

KEYWORDS

predictors, quality, nurturing care, childcare centers, slums, informal settlements

Background

There is a growing focus on early childhood development (ECD) in low- and middle-income countries (LMICs) with the World Health Organization's (WHO) Nurturing Care Framework (1), providing a much-needed guide to improve early childhood health, nutrition, safety, early learning, and development. Governments and donor organizations have supported mainstream ECD programs and policies, particularly on health and nutrition and pre-school-age children (older than 3 years) (2).

Despite the challenges, substantial efforts have been made to improve childcare in sub-Saharan Africa. Governments, NGOs, and international organizations have launched various programs and policies to address the needs of children. The African Union's Agenda 2063 emphasizes investing in early childhood development and recognizing its long-term impact (3). Additionally, the UNICEF-led Early Childhood Development Action Network (ECDAN) has been instrumental in expanding access to quality childcare services across the region (4, 5).

These studies have alienated challenges with childcare and how financing childcare through subsidies can enable women to engage in paid work to earn; however, there is little focus on childcare services for younger children (0–3 years) in LMICs (6). Sub-Saharan Africa grapples with several challenges in providing adequate childcare. Factors such as poverty, limited access to education, and healthcare disparities contribute to suboptimal childcare conditions. High child mortality rates, malnutrition, and inadequate early childhood development opportunities remain significant concerns. Childcare for 0–3 years in LMICs is almost exclusively provided by the private sector, and in low-income communities, the quality leaves a lot to be desired.

The need for childcare services became critical in East and Central Africa with the advent of the HIV scourge, which left several children without parents (primary caregivers) and led to the establishment of alternative childcare services including institutional- and community-based care, such as foster care by relatives and others. However, as revealed by Save the Children, UK, in the majority of these childcare services, the quality was below the standard stipulated in the UN Convention on the Rights of Child (UNRC). Core to the poor quality is the lack of understanding of the nature of care that is tailored to a non-family care context. To address this gap, Save the Children, UK, working with other partners, put together a comprehensive set of quality indicators that can be applied across diverse contexts including resource poor and emergency settings, to guide the assessment and improvement of childcare for child development. The focus on childcare is particularly important in the context of rapid urbanization, with over half of the world's population living in urban settings and increases in women's employment outside the home. This has contributed to an increasing demand for affordable childcare options, particularly in low-income urban settings.

Quality childcare centers have the potential to provide multiple benefits to children, families, and societies (1) through women's

participation in the labor force (7–11). Increases in parental employment, particularly of mothers, have the potential to provide indirect benefits to the children through increased household income and improved nutrition (12). A well-facilitated childcare center that provides opportunities for learning and play, good feeding, and access to healthcare has the potential to nurture and optimize child development (13–18) with stronger benefits for children living at an economic disadvantage (19). WHO's Nurturing Care Framework specifies the need for an environment that promotes children's good health, appropriate nutrition, responsive caregiving, safety and security, and opportunities for early learning.

The *Good health* component of the nurturing care framework ensures the health and wellbeing of the child and caregiver and includes family planning, HIV testing, prevention of mother-to-child transmission of HIV, essential newborn care including kangaroo care for small babies, immunization of mother and child, growth monitoring and counseling, promotion of health and wellbeing including healthcare-seeking behavior, prevention and treatment of childhood illness, and caregiver's physical and mental health problems, and care for children with developmental difficulties or disabilities. The *Adequate nutrition* component emphasizes good mother's nutrition during pregnancy, exclusive breastfeeding (0–6 months), balanced complementary feeding and weaning from 6 months, food safety and family food security, and feeding practices that accommodate social and emotional interaction.

Responsive caregiving emphasizes observing and responding to children's movements, sounds and gestures, and verbal requests. It also highlights the importance of mutually enjoyable interactions to create an emotional bond, which helps young children understand the world around them and learn about people, relationships, and language. Responsive caregiving is thus the basis for protecting children against injury and the negative effects of adversity, recognizing and responding to illness, enabling enrichment, and building trust and social relationships.

Opportunities for early learning is based on the fact that learning begins from conception, and hence, this component emphasizes the importance of providing opportunities for children to acquire skills and capacities interpersonally, in relationship with other people, through smiling and eye contact, talking and singing, modeling, imitation, and play.

Safety and security emphasizes the need to ensure a safe and secure environment for children, protection from physical harm/injury and emotional/psychological stress (fear and anxiety) and maltreatment, and ensuring good mental health of the caregiver.

The five nurturing care components together provide for the provision of quality childcare services (1) and the criteria for aspects to consider while assessing the quality of childcare centers and other environments in which children are raised.

The importance of ensuring quality provision of childcare cannot be overstated with evidence of poor quality childcare centers that provide limited cognitive stimulation being likely to limit children's development (20). However, worldwide, more than 40% of all children below primary school age or nearly 350 million in LMICs do not have

access to the quality childcare services they need (20). Inequalities in childcare provision are worse in specific parts of the world, and they certainly deepened significantly following the lockdown measures to control the COVID-19 pandemic which resulted in the closure of already limited childcare services. Children are exposed to poor-quality, home-based, and center-based childcare that increases the risk of poor outcomes (21). Such low-quality childcare services are reported across the diversity of socioeconomic divides within Africa. In East and Central Africa, despite the increased awareness of and intention to support children's rights on the part of individuals, NGOs, and governments, the majority of institution- and community-based childcare services are still not meeting the desired standard (Save the Children, UK report) (22). This is mostly in the poorest communities such as the urban informal settlements where poverty, high illiteracy levels, poor infrastructure, and lack of access to services contribute to poor quality (23). In the more developed countries, e.g., South Africa, there has been significant progress in childcare and ECD services, with approximately 58% of children accessing childcare; however, there are still gaps in infrastructure, nutrition, ECD programs, teacher training, institutional capacity, and funding, and the major drivers are poverty, education, health, and HIV/AIDS (24). Similar challenges are reported in low-income settings outside Africa (25). Beyond the influence of poverty, unique and contextually specific factors appear to determine the quality of childcare centers across low-income settings (26, 27). For instance, in Florida, USA, the best predictors of higher quality care and sensitive caregiver–child interaction in centers were specialized caregiver training, higher adult–child ratios, use of planned activities, and less perceived stress by caregivers (28). There is, however, limited empirical data on the contextual drivers of the quality of childcare centers in urban–poor (slum) communities in sub-Saharan Africa. We aimed to establish the quality of childcare centers in two slums in Nairobi, Kenya, and identify key factors associated with quality (including knowledge and skills of center providers, characteristics of the childcare centers, and the center providers' sociodemographic characteristics). This assessment preceded the co-design and feasibility testing of an intervention that aimed to improve the quality of childcare service provision in low-income urban neighborhoods.

Methods

Study design

The current study forms a part of a larger study that employed a phased sequential feasibility design with pre- and post-intervention assessments of the quality of childcare environment in two informal settlements (Korogocho and Viwandani) in Nairobi (29). Baseline (pre-intervention) assessments reported in this study were based on a cross-sectional survey to map and profile childcare centers in the two settlements prior to the implementation of the intervention.

Study setting

The study was conducted in Korogocho and Viwandani, two large informal settlements in Nairobi. These communities represent urban poor settings where children of working mothers are usually taken to

local low-cost childcare centers, which are likely to provide substandard care. The sociodemographics of these communities have been well characterized within the Nairobi Urban Health and Demographic Surveillance System (NUHDSS) by the African Population and Health Research Centre (APHRC) (23). Korogocho and Viwandani slum settlements, located approximately 7 km from each other, are densely populated with 63,318 and 52,583 inhabitants per square km, respectively. The settlements are characterized by poor housing, poor sanitation, lack of basic infrastructure, insecurity, high crime rate, and poor access to maternal and child health (MCH) services and healthcare in general (23). A high proportion of mothers in these communities are engaged in low-paid employment, which only affords low-quality childcare within the community.

Participant and inclusion criteria

Centers were eligible for mapping and profiling if they were located in either one of the two settlements, if they provided paid childcare services for children under five years and were operational, and if the managers/owners were willing to participate in the study. We focused on children younger than 5 years because they do not go to pre-school and their parents or guardians are likely to use childcare services when they go outside for work. By design, all eligible childcare centers within Korogocho and Viwandani were included in the mapping and profiling exercise, except for those that were not available after three visits by the data collectors. We identified 129 childcare centers, 52 in Korogocho and 77 in Viwandani, that were operational at the time of the data collection. Eligibility for the detailed quality assessment was that the center was home-based, center-based, or faith-based as defined in Table 1. Due to the relatively high levels of support provided to school-based centers, these were not included in the detailed assessment and intervention. Based on this criterion, 68 out of 129 centers were eligible for detailed assessments, of which 66 had complete data (Figure 1). These centers form the study sample for the current study.

Procedures

Mapping of childcare centers

Childcare centers in Korogocho and Viwandani informal settlements in Nairobi County were mapped using the Global Positioning System (GPS) coordinates. Residents from the two settlements were recruited and trained as field interviewers (FIs) to conduct the mapping survey. These FIs had a minimum of O-level education, were fluent in Kiswahili, were familiar with the study community, and had some experience in administering qualitative and quantitative interviews. Within their designated villages and with the support of community health volunteers (CHVs), FIs visited households asking if there were any centers where staff were paid to look after children younger than 5 years. Childcare centers in nine villages in Korogocho (Grogan A, Grogan B, Gitathuru, Nyayo, Kisumu Ndogo, Korogocho A, Korogocho B, Highridge, and Ngomongo), covering 0.86 square kilometers, and in seven villages in Viwandani (Paradise, Sinai, Jamaica, Lunga Lunga, Donholm, Kingstone, and Riverside), covering 0.59 square kilometers, were mapped. Once the FIs identified a childcare center, they captured

TABLE 1 Typology of center-based childcare providers.

Home-based	These centers are within the dwelling units of the childcare center providers. In some cases, the providers hired separate rooms within the location where they lived and designated the rooms for use as childcare centers. In most cases, however, the same room where the childcare center provider lived also served as the childcare center. Most of the center providers in this category started the childcare center business out of necessity (due to lack of employment) and initially started by looking after neighbors' children and then turned this into business. The majority do not have any training in ECD or in any other childcare-related aspects.
School-based	These centers are based on the school system, usually attached to a primary school. In these cases, the schools have a childcare center unit, which also serves as a pre-primary school unit. Most of the care providers in this category are trained ECD and primary school teachers; some are also pursuing degrees in education.
Center-based	These are autonomous centers operating in buildings, purposely built for the provision of childcare services. They are not a part of a residential building and do not have a primary school section. Some of the providers in this category are ECD-trained.
Faith-based	These are childcare centers that are nested within a church or a mosque and are started by the church/Mosque. The teachers are also employed by the respective faith groups.

their location details using GPS (embedded in the SurveyCTO platform that was used for data collection). Then, they recorded basic details of the center through interviews with the childcare providers. The process included observing the facilities in the childcare center and checking any available records on basic information on the childcare centers, e.g., length of operations, opening hours, numbers of staff, children, rooms, age of children (upper and lower limits), charges (per day and any additional time/out of hours), type of center, any organizational support, and name of local CHVs to enable the delivery of the intervention in the implementation feasibility phase. A typology of childcare providers was developed by the investigator team together with Kidogo, a social enterprise, that runs childcare centers in informal settlements in Nairobi and is a partner in this study, and the sub-county health team to enable categorization of the assessed centers (Table 1). Since the number of childcare centers in Korogocho and Viwandani was not known, we aimed to include as many centers as possible, including the different types of childcare centers. Childcare center providers were asked if they were interested in more detailed quality assessments and knowledge, skills, and attitude assessments using questionnaires. Those who gave consent to a detailed assessment and joined the proposed skills-building CoP intervention were included in the detailed assessments that were conducted after 2–3 weeks of the mapping.

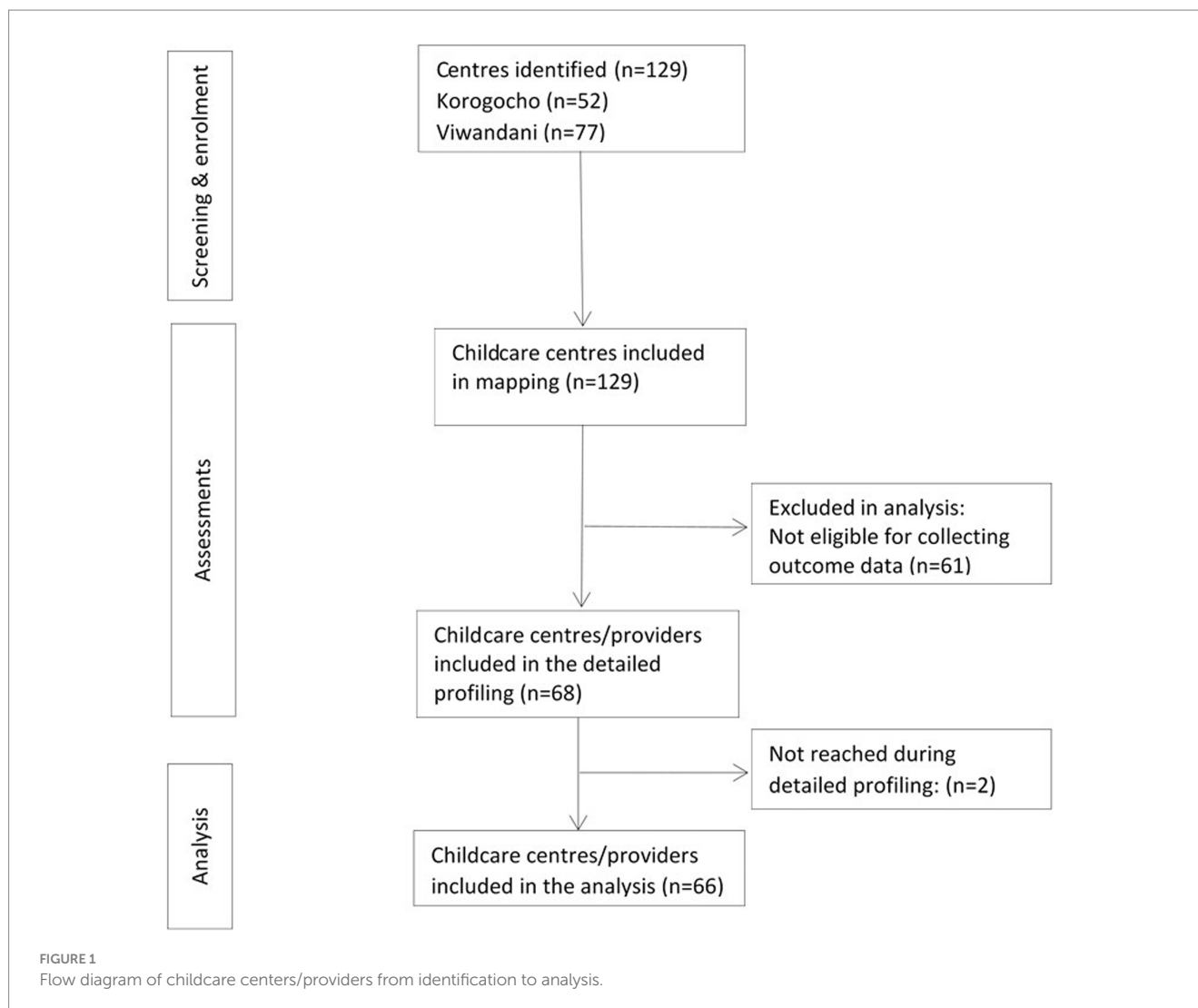
Assessing the quality of the childcare environment

Following the mapping, the field team went back to the mapped childcare centers that agreed to be assessed to conduct a detailed assessment of center quality and skills of center providers and CHVs. A quality assessment tool was developed, drawing on tools currently used by Kidogo. Tools, such as the Family Childcare Environment Rating Scale®, Revised (FCCERS-R) (30), have been considered for use; however, as many of such tools were developed and used in high-income contexts, items required considerable adaptation to the context of informal settlements in Kenya. Furthermore, we planned to design the tool to be used within routine practice by a CHV or other community workers, to support the improvement in the childcare centers. We anticipated that the simple quality assessment tool would be revised during the co-design and implementation process, as we learned more about its feasibility, appropriateness, and the type of information required.

The quality assessment tool benefited from feedback received from sub-county health teams and parents and center providers themselves on the weak areas in childcare, together with the materials used by Kidogo. The tool focused on (i) child protection, safety, discipline, and abuse; (ii) stimulating environment; (iii) responsive caregiving; (iv) learning through play; (v) health; (vi) nutrition; (vii) water, sanitation, and hygiene; and (viii) business and administration. With the exception of business administration, the domains align with the Nurturing Care Framework components of the WHO, i.e., good health, adequate nutrition, responsive caregiving, safety and security, and opportunities for early learning (1). The business domain focuses on the capability of center providers to provide quality service while at the same time earning an income to live. Several items were generated under each category. They were piloted at a few centers and refined further, yielding 38 items that were used in the assessments. Each item is scored by ticking in the box against the item if available or by crossing in the box if the item is not available. Each ticked item was equivalent to one score, and the total score was the number of all the ticked items. The total score was converted to a percentage to enhance intuition. A combination of interviews and observations done within the center was used to administer the tool. On average, the tool took approximately 45 min to complete. Details of the tool are presented in Appendix 1.

Assessing knowledge, skills, and attitudes of childcare center staff

Questionnaires were administered to the childcare providers to assess their knowledge, skills, attitudes, and opportunities/barriers to implement this knowledge and attitudes within the areas of stimulation, nutrition, health and safety, staff and training, parent involvement, and resource management. The assessment was administered to center providers who agreed to the quality assessment visits. Similar to the quality assessment tool, the skills questionnaire focused on: (i) child protection, safety, discipline, and abuse; (ii) stimulating environment; (iii) responsive caregiving; (iv) learning through play; (v) health; (vi) nutrition; (vii) water, sanitation, and hygiene; and (viii) business and administration. The items were piloted on approximately 10 center providers and finalized with 53 items. Details of the tool are presented in Appendix 2. The interviews were conducted face-to-face or on the phone for those who could not be reached because of the movement



restrictions due to COVID-19. Interviews lasted, on average, for 45 min to 1 h.

Data analysis

Descriptive analysis

Descriptive statistics (frequencies, means, medians, standard deviations, and interquartile ranges) were used to summarize the data. Means (SD)/median (IQR) were reported for continuous variables such as the quality of care score, while frequencies and percentages were used for the categorical variables such as type of childcare center. Scatter plots with fitted values were used to illustrate the degree and direction of the relationship between the quality of care score and each of the continuous independent variables: center provider age, KAP score, number of children in the center, years of operation of childcare center, and the caregiver/child ratio. In addition, Pearson's correlation was used to quantify the degree of the relationship between the quality of childcare center and potential predictive factors. Some continuous variables (number of children, years of operation, and caregiver-to-child ratio) were log-transformed to improve their linear relationship with the

dependent variable (quality of care score). The correlation between predictor variables (center provider KAP score, age, education level, caregiver–child ratio, and years of operation) was determined using Spearman's rank correlation since an ordinal variable (education level) was involved. Mean (95% CI) quality of childcare center scores were plotted against the categorical predictors (center provider sex, location of childcare center, level of education of provider, and the type of childcare center).

Analysis for predictors of quality of childcare centers

The association between the quality of childcare center score (outcome) with predictors was examined using linear regression. Simple linear regression and multiple linear regression with robust standard errors were used to determine the crude and adjusted associations, respectively, between the quality of care score and the predictors. In the models, the dependent variable was the quality of care score, while the independent variables included center provider knowledge and skills score (%), center provider sociodemographic characteristics, and childcare center characteristics, such as type, location, size, and duration since establishment. The β -coefficient and the corresponding 95%

confidence interval and value of p were reported. Mapping data (GPS coordinates) were used to generate maps to display the distribution of childcare centers within the two locations by type and offset to maintain the anonymity of centers.

Results

Basic mapping and profiling characteristics of childcare centers

A total of 129 informal childcare centers (defined as childcare centers within the slums) were identified in Korogocho and Viwandani slums. A significant proportion of the identified centers (40%) was attached to schools; however, several others (35%) were home-based. This was particularly the case in Viwandani where 52% of all mapped centers were home-based. Home-based center providers reported particularly low levels of support (9%) and training on ECD (20%) compared with the centers, faith, or school-based centers. The distribution of these centers in the two study sites is presented in Figures 2, 3.

The map of Nairobi County with ward boundaries puts into context the location of the two study areas located in different wards (Figure 2). As shown by maps in Figures 3, 4, there was a higher concentration of home-based centers than other types in Viwandani, while in Korogocho, the school-based centers were more dominant than the other types. Within each location, the centers were not evenly

distributed across the area, and they tended to cluster along the roads and junctions.

Detailed quality assessment

A total of 66 childcare centers were profiled in Korogocho and Viwandani settlements in Nairobi between 25 March 2021 and 13 April 2021. More than three-quarters (77%) of the childcare centers were in Viwandani, and almost all (95%) of the center caregivers were women (Table 2). The mean age of the center caregivers was 40 years, ranging from 23 to 74 years. Approximately two-thirds (68%) of the centers were home-based, while the median of caregiver: child ratio was 8, ranging from 1 to 54. The mean of center provider KAP score was 72% (SD = 10%) while that of quality of care score was 59% (SD = 11%). The characteristics of the centers and center providers are presented by type of center in Table 2.

Correlations between predictor variables

Correlation analysis between numerical and ordinal predictor variables revealed that the predictors were weakly correlated with each other; all correlation coefficients (Spearman's ρ) were less than 0.5. The correlation between center provider knowledge score and their education level was $\rho = 0.228$, showing that center provider knowledge

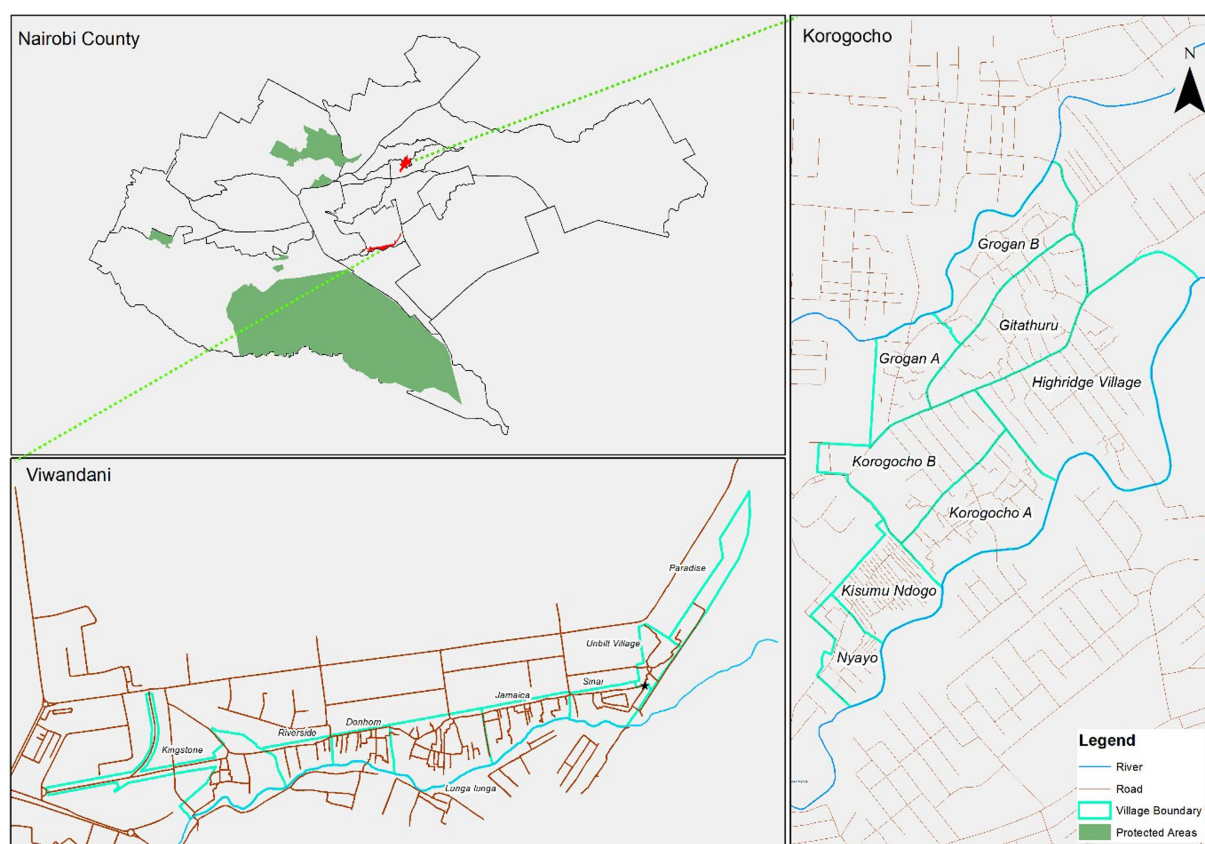


FIGURE 2
Base maps – Nairobi County ward boundaries and the two study areas.

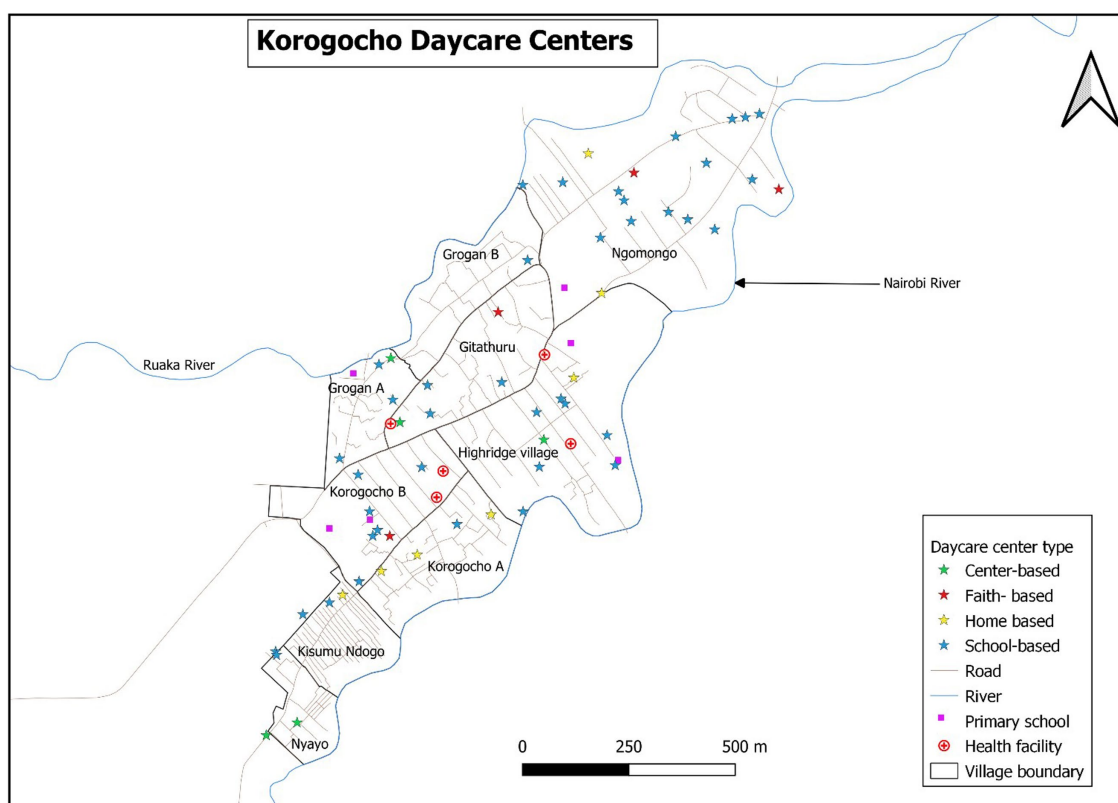


FIGURE 3
Distribution of the childcare centers by type and the essential facilities in Korogocho.

was weakly related to the level of education. The correlation matrix is shown in [Table 3](#).

Internal consistency of the tools and interrater reliability

Four field interviewers took part in the administration of the questionnaires to the center providers and the quality assessments through observation. We used Cronbach's alpha to measure the internal consistency of the quality tool. This was done for data collected by each of the observers. Generally, there was a high level of internal consistency ranging from 0.81 alpha to 0.86 alpha, as shown in [Appendix 3](#). There was no reliability check for the observers because paired observations were not possible during the COVID-19 restrictions when data collection was done.

Quality of childcare center score

There were 31 items under childcare center quality each assigned one point for a correct response ([Appendix 1](#)). The score was given in terms of percentage; hence, the highest possible score was 100 (i.e., 31 points). The overall mean quality score was 59% (95% CI: 56, 61). The childcare centers had the highest score in responsive caregiving (97%; 95% CI: 93, 100) and the least score in learning through play (24%; 95% CI: 17, 31). They had above-average scores in four components

(responsive caregiving, WASH, nutrition, and child protection and safe environment) and below-average score in three components (learning through play, business administration, and health) ([Figure 5](#)).

Distribution of the quality of childcare center score based on potential predictors

Categorical potential predictors

The mean quality of care score was similar, regardless of sex [men: 63.4; women: 58.3; $p=0.155$] and location ($p=0.344$), while it was significantly different between levels of education ($p=0.030$) and type of childcare center (home-based vs. center-based: $p=0.003$; home-based vs. faith-based: $p<0.001$) ([Figure 6](#)). In Korogocho, the mean score was 61% (95% CI: 54, 68), while in Viwandani, it was 58% (95% CI: 55, 60). The mean scores in the two locations were not significantly different. Center caregivers with primary education had a mean of 55% (95% CI: 51, 60) while those with secondary and above had 61% (95% CI: 58, 65). Regarding the type of childcare center, faith-based centers had the highest mean score [70% (95% CI: 68, 72)], followed by center-based [65% (95% CI: 59, 71)] and, lastly, home-based [55% (95% CI: 52, 58)].

Continuous potential predictors

The continuous predictors were plotted against the quality of care score to illustrate the magnitude and direction of their

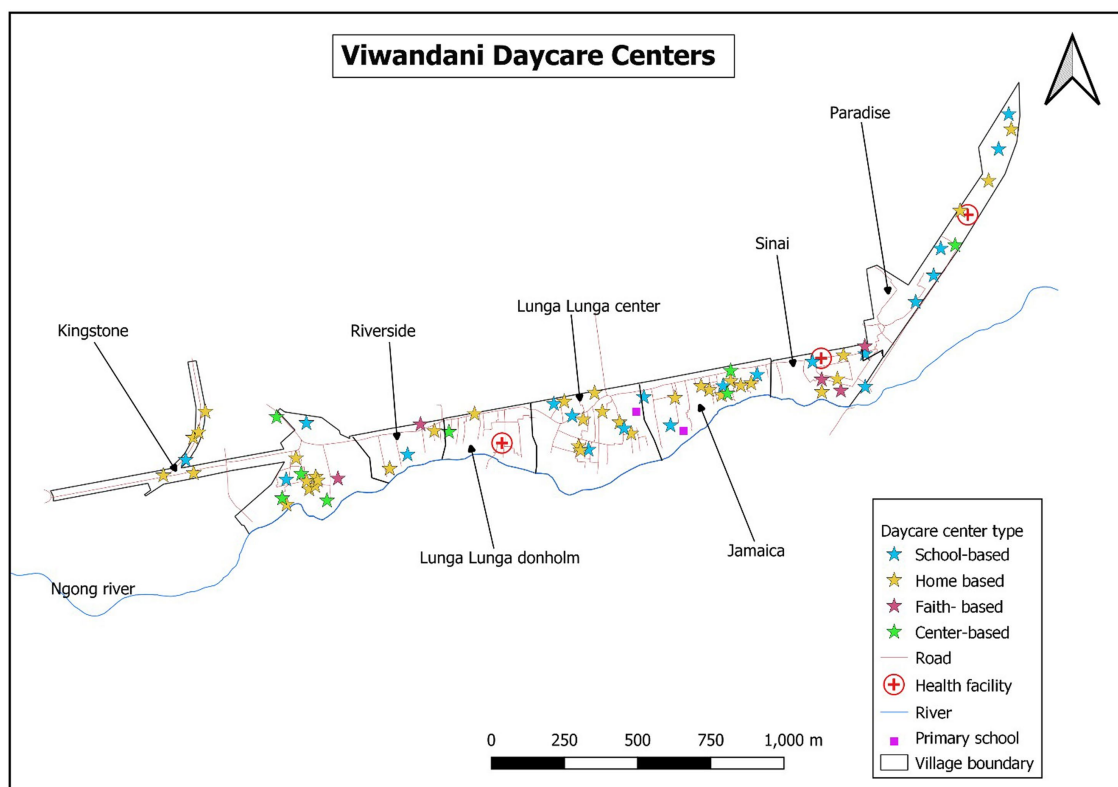


FIGURE 4
Distribution of the childcare centers by type and the essential facilities in Viwandani.

relationship (Figure 7). The number of children in the center, years of operation of the center, and the ratio of children: caregiver had non-linear relationships with the outcome variable (quality of care score). As a remedy, these three variables were log-transformed. There was a moderate correlation between the quality of care score and the three potential predictors, namely, caregivers' KAP ($r = 0.586$), the natural logarithm of the number of children in center ($r = 0.409$), and the natural logarithm (\ln) of the ratio of children: caregiver ($r = 0.402$). The two other predictors had weak correlations with the quality of care score: caregiver age ($r = 0.131$) and the natural logarithm years of operation of center ($r = -0.076$).

Crude associations between center caregiver and childcare center characteristics, with quality of center score

Significant individual predictors included education level, type of center, whether center received some form of support, the ratio of the number of children to one caregiver, number of children in the center, and center provider KAP score.

The mean quality score of center caregivers with at least secondary education was 6.13% higher than that of caregivers with primary education ($\beta = 6.13$; 95% CI: 0.63, 11.63). For every 1% increase in the caregiver's KAP score, the quality of care score increased by 0.68% ($\beta = 0.68$; 95% CI: 0.44, 0.93) (see Table 4).

Adjusted associations between the center caregiver and childcare center characteristics with center quality score

A multiple linear regression model was used to determine the adjusted effect of the predictors on the quality of care score. The regression model was statistically significant ($p < 0.001$), implying that the model can statistically significantly predict the outcome (quality of childcare center score). The adjusted $R^2 = 0.475$, indicates that our model explains 47.5% of the variation in the quality of childcare center score in the study population (Table 5).

The type of childcare center (faith-based vs. home-based: $p = 0.008$) and the center provider KAP score ($p = 0.003$) were statistically significantly associated with the quality of care score. After adjusting for the other factors in the model (Table 5), the mean quality of childcare center score of faith-based centers was 9.2% points higher than that of home-based centers ($\beta = 8.68$; 95% CI: 2.32, 15.04). In other words, faith-based centers provided better quality childcare services than home-based centers.

Controlling for other predictors in the model (including the interviewer effect), for every 1% increase in the caregiver KAP score, the mean quality of childcare center score increased by 0.51% ($\beta = 0.51$; 95% CI: 0.18, 0.84). This implies that there was a positive association between the KAP score and the quality of childcare center score, that is, the higher the KAP score, the higher the quality score (Table 5). The interviewer effect was not significantly associated with the quality of center score.

TABLE 2 Summary statistics of childcare centers and center providers by type of center.

Variable	Level	Home-based (N = 45)	Center-based (N = 14)	Faith-based (N = 7)	Total (N = 66)
Caregiver sex	Male	0 (0%)	2 (14%)	1 (14%)	3 (5)
	Female	45 (100%)	12 (86%)	6 (86%)	63 (95)
Caregiver Age (years)	Mean (SD)	40 (9)	39 (10)	44 (14)	40.2 (10.0)
	Range	[23–74]	[23–57]	[24–63]	[23–74]
Highest education level completed	Primary	27 (60%)	2 (14%)	1 (14%)	30(45)
	Secondary+	18 (40%)	12 (86%)	6 (86%)	36(55)
Location of childcare center	Korogocho	7 (16%)	5 (36%)	3 (43%)	15 (23)
	Viwandani	38 (84%)	9 (64%)	4 (57%)	51 (77)
Provider trained in ECD		8 (18%)	9 (64%)	5 (71%)	22(33%)
Number of caregivers in center	Median (IQR)	1 (1–1)	2 (1–2)	1 (1–2)	1(1–2)
	Range	[1–4]	[1–3]	[1–2]	[1–4]
Number of children in center	Median (IQR)	7 (4–10)	26 (15–36)	33 (20–54)	10(5–20)
	Range	[1–25]	[2–68]	[11–62]	[1–68]
Caregiver: child ratio	Median (IQR)	7 (4–8)	14 (9–22)	21 (11–53)	8 (5–13)
	Range	[1–20]	[2–30]	[10–54]	[1–54]
Years of operation (median, IQR, and range)	Median (IQR)	2 (1–7)	4 (2–10)	4 (3–14)	3.5 (1–8)
	Range	[0–22]	[0–27]	[1–21]	[0–27]
Receive support from any organization		4 (9%)	2 (14%)	1 (14%)	7(11%)
Center provider KAP score (percentage of correct responses)	Mean (SD)	69 (9)	78 (9)	75 (7)	72 (10)
	Range	[47–85]	[63–94]	[65–87]	[47–94]
Quality of childcare score (percentage of correct responses)	Mean (SD)	55 (10)	65 (11)	70 (3)	59 (11)
	Range	[35–77]	[48–87]	[67–74]	[35–87]

TABLE 3 Spearman's rank correlation coefficients between predictor variables.

Variables	Knowledge score	provider age	Education level	Caregiver-child ratio	Years of operation
Knowledge score	1.000				
Provider age	−0.019	1.000			
Education level	0.228	−0.089	1.000		
Caregiver-child ratio	0.251	0.142	0.392	1.000	
Years of operation	−0.181	0.152	0.047	0.334	1.000

Predicted values of quality score across significant factors

The predicted values of the quality of care score increased consistently with increasing center provider KAP score (Figure 8). Faith-based centers had the highest mean predicted quality score (66%), followed by the center-based (60%) and, lastly, home-based (57%) centers.

Discussion

The current study examined profiles and predictors of the quality of childcare centers in two slum communities (Korogocho and Viwandani) in Nairobi, Kenya, ahead of the implementation of a

co-designed intervention, that aimed to improve the quality of childcare centers. We found a relatively high concentration of informal childcare centers in the two informal settlements, the majority of which were home-based centers, particularly in Viwandani, which is closest to the industrial areas of Nairobi. This is consistent with an earlier report indicating that 46% of employed and 23% of unemployed parents in the slums (Korogocho) use paid childcare as the primary childcare strategy (31). The high proportion of women in this location working outside the home (31, 32) explains this high demand and mushrooming of informal childcare centers. Our data highlight the low level of support or training received by the providers, the majority of whom are women, running these centers. Similar quality issues have been reported in studies that have examined the provision of childcare within similar urban settlements in Africa (33, 34).

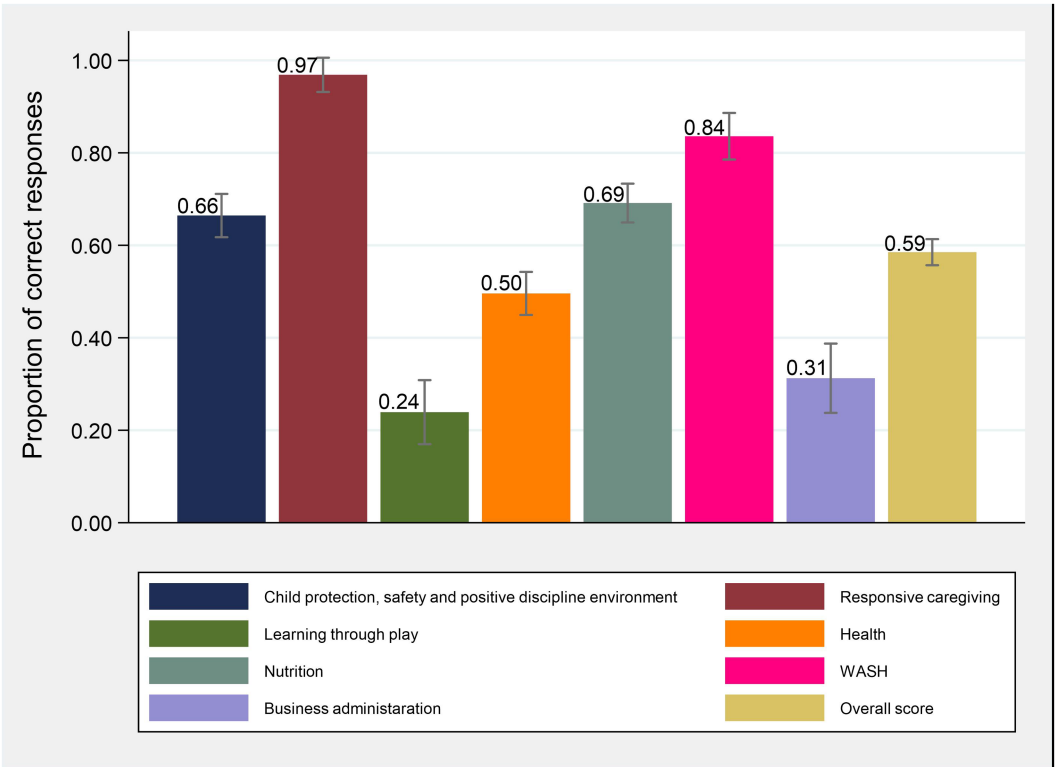


FIGURE 5
Average quality of care score across different components (mean (95% CI) proportions).

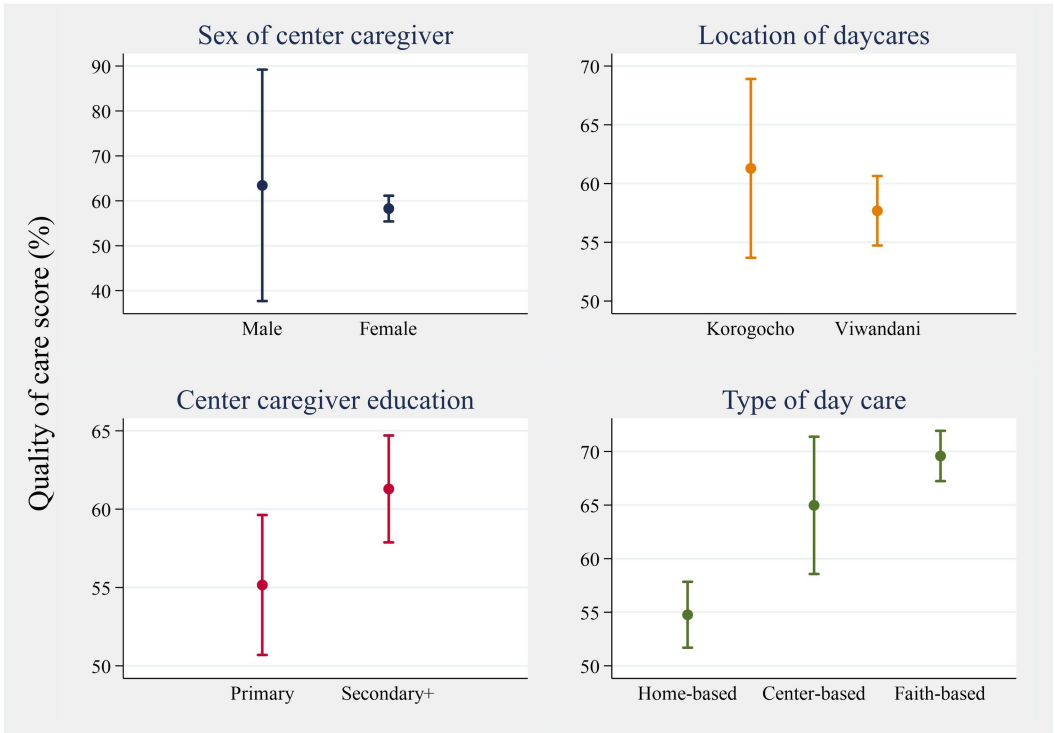


FIGURE 6
Mean (95% CI) of the quality of care score across categorical predictors.

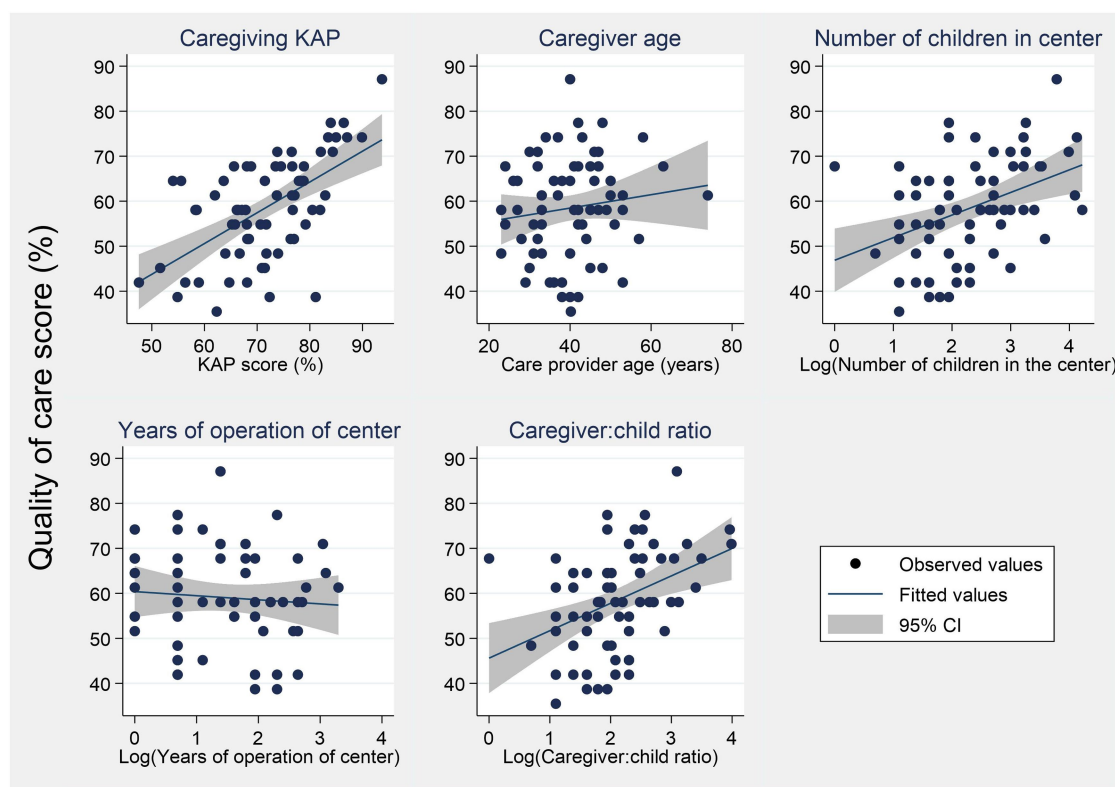


FIGURE 7
Distribution of the quality of care score across continuous outcomes.

The data show generally moderate quality scores (mean = 59%) across the types of centers, especially among home-based childcare centers (barely at a score of 55%) which were the majority. The results also reveal two major predictors of quality, i.e., center caregiver knowledge and practice (KAP) score and type of childcare center. Higher scores of center provider KAP were significantly associated with higher scores on center quality, while home-based childcare centers were associated with the lowest quality of care, followed by center-based and faith-based daycare centers. Other characteristics including provider education, location of center, and child-to-caregiver ratio showed significant crude correlations with the center quality; however, these diminished after multivariable analysis. Given the low quality of centers, an intervention that promotes the standard of care for optimum child growth and development is critical (35).

The finding that center provider knowledge and practices and type of center significantly predicted quality indicates that these two factors should be targeted in improving the standards of childcare facilities in this setting. The poor skills of center providers observed could be attributed to a lack of training in childcare or ECD. Furthermore, the majority of the centers were not registered, which, as reported in a related intervention development paper (36), was in part because of the lack of qualification required for registration.

While the quality of childcare center environment across the different types of centers was generally poor, home-based childcare centers were markedly poor in most of the aspects and seem to be a major driver of the overall quality score since they formed a greater

proportion of the centers. The poor quality of home-based centers would be expected; since from our experience and interaction with the providers, the center managers/providers were generally not trained and did not receive any external support to run the daycare, e.g., from the government or NGOs. Home-based centers were usually established informally by a community member who volunteers to help out another woman who wants to join paid work but has no one to take care of her child. Gradually, more and more women approach the volunteer and the number of children under her care grows to become a fully-fledged childcare center within her household. While such centers respond to the need for childcare in the community, they provide substandard facilities characterized by small, dark spaces with limited or no play area, poor WASH facilities, lack play materials, and are run by providers who are neither trained nor experienced, thus putting the children under their care at risk of poor health, growth, and development (35).

The findings of this study contribute new evidence to the currently small but growing evidence on childcare centers in LMICs, particularly on the quality of childcare centers and key drivers of the poor standards of childcare centers in the informal settlements in Nairobi. These findings indicate the need for interventions to improve childcare services in these low-income settings by addressing the lack of skills of center providers and other factors contributing to the poor childcare environment. Furthermore, the findings extend our understanding of factors that determine the quality of childcare services and are consistent with the findings from previous studies. For instance, caregiver practices, particularly their interactions with

TABLE 4 Crude association between the quality of care score and the center caregiver and childcare center characteristics.

Variable	Level/statistic	Mean (SD)/ Correlation	Crude association	
			β -Coefficient (95% CI)	Value of <i>p</i>
Caregiver sex	Male	63.4 (\pm 10.4)	ND	ND
	Female	58.3 (\pm 11.4)		
Caregiver Age (years)	Correlation ^a	0.131	0.15 [−0.06, 0.35]	0.155
Highest education level completed	Primary	55.2 (\pm 12.0)	Ref.	
	Secondary+	61.3 (\pm 10.1)	6.13 [0.63, 11.63]	0.030
Location of childcare center	Korogocho	61.3 (\pm 13.7)	Ref.	
	Viwandani	57.7 (\pm 10.5)	−3.61 [−11.16, 3.95]	0.344
Type of childcare center	Home-based	54.8 (\pm 10.2)	Ref.	
	Center-based	65.0 (\pm 11.1)	10.20 [3.60, 16.82]	0.003
	Faith-based	69.6 (\pm 2.5)	14.82 [11.24, 18.40]	<0.001
Center received some form of support	No	57.7 (\pm 11.6)	7.24 [1.53, 12.95]	0.014
	Yes	65.0 (\pm 6.8)		
Log (Caregiver: child ratio)	Correlation ^a	0.402	6.09	0.002
			[2.41, 9.77]	
Log (number of children in center)	Correlation ^a	0.409	4.97 [2.00, 7.95]	0.001
Log (years of operation)	Correlation ^a	−0.076	−0.91 [−3.73, 1.91]	0.520
Center provider KAP scores (%)	Correlation ^a	0.586	0.68 [0.44, 0.93]	<0.001

ND – Association not done due to small count in one cell (men); ^aPearson's correlation.

The bold statistics represent those factors that are significantly associated with quality of childcare centers.

TABLE 5 Adjusted association between quality of childcare center and potential predictors.

Variable	Level	Adjusted association		
		β -Coefficient	[95% CI]	Value of <i>p</i>
Caregiver Age (years)	Mean	0.10	[−0.09, 0.30]	0.299
Highest education level completed	Primary	Reference		
	Secondary+	1.55	[−3.08, 6.19]	0.504
Location of childcare center	Korogocho	Reference		
	Viwandani	0.77	[−4.73, 6.28]	0.779
Type of childcare center	Home-based	Reference		
	Center-based	3.65	[−2.57, 9.87]	0.245
	Faith-based	8.68	[2.32, 15.04]	0.008
Center received some form of support	No	Reference		
	Yes	3.65	[−2.51, 9.81]	0.240
Children: caregiver ratio	Mean	1.01	[−2.98, 5.00]	0.614
Center provider KAP scores	Mean	0.51	[0.18, 0.84]	0.003
Field interviewer	Interviewer 1	Reference		
	Interviewer 2	−0.20	[−5.62, 5.22]	0.942
	Interviewer 3	−2.01	[−7.70, 3.68]	0.481
	Interviewer 4	−2.04	[−8.56, 4.47]	0.532
Model summary statistics				
Mean dependent variables	58.504	SD dependent variable	11.315	
R-squared	0.475	Number of observations	66	
F-test	7.834	Prob > F	<0.001	

The bold statistics represent those factors that are significantly associated with quality of childcare centers.

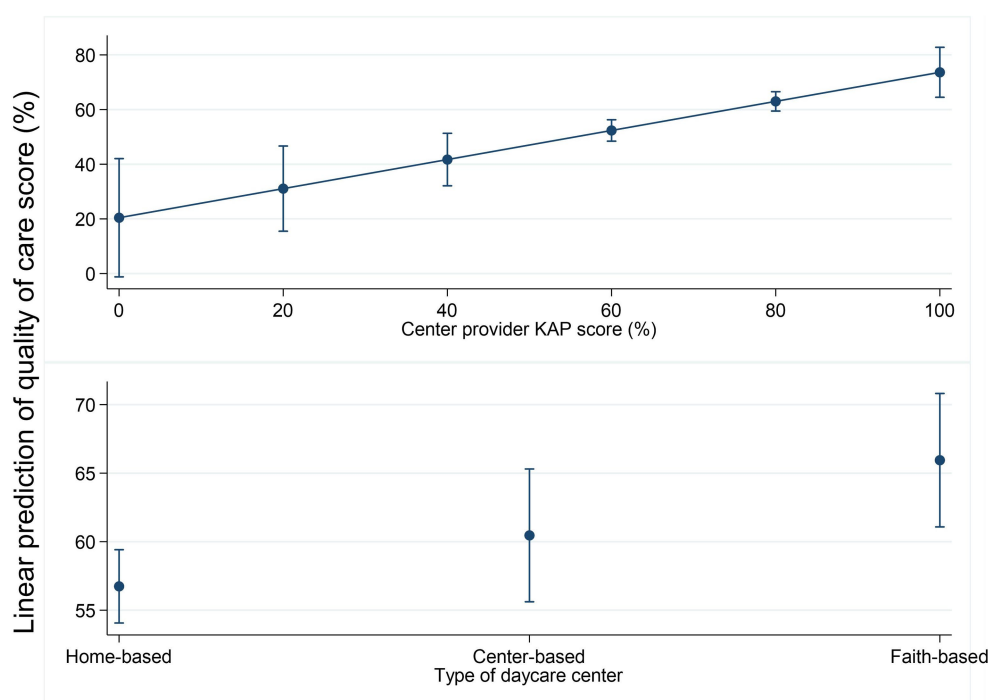


FIGURE 8
Linear prediction of the quality of care by center provider KAP score and center type.

children, have been reported to affect the quality of childcare services in South Korea (26) and other low-income settings in the US, South America, and Europe (37). In other studies, e.g., a study by Ghazvini and Mullis (28), the role of specialized caregiver training, higher adult–child ratios, and use of planned activities have been reported as best predictors of higher quality care and sensitive caregiver–child interaction in centers. However, in our study, the effect of the care provider and child ratio diminished significantly when we adjusted for other factors.

Limitations

Our study had some limitations. The center provider KAP score was a global variable derived from summing several items and used as a summative score in the analysis of the association with center quality. Given the small sample size, it was not possible to examine associations with individual items or conduct factor analysis to identify the most important components of caregiver KAP. Similarly, within center type, there should be specific characteristics that are most critical; however, adjusted regressions with the number of children in the center, caregiver–child ratio, and years of operation were not statistically significant. This might also be obscured by the small sample size, and hence, further studies with a large sample size may reveal the most critical characteristics of the center environment. The mapping and assessments were done within the context of the COVID-19 pandemic and therefore may have missed some of the childcare centers that were closed temporarily due to the restrictions on

schools at that time. The cross-sectional design used to assess the predictors at baseline provides useful insights into the associations between the quality of daycare and other factors; however, it does not infer causal effect direction. Finally, we acknowledge the absence of a reliability check on the observers because paired observations were not possible during the COVID-19 restrictions when data collection was carried out.

Conclusion

Although conditions are poor and education levels of childcare center providers are low, improvements in quality are possible with interventions that can increase knowledge and skills. It is, therefore, important that programs that aim to improve the quality of childcare in such settings focus on training and support supervision of center providers.

Recommendations for policy, practice, and research

Based on the findings of this study, we recommend training and support supervision of childcare center providers with priority to home-based centers to enhance their capacity to provide quality care for the children. We recommend larger studies employing experimental designs to examine the influence of several factors and identify the most important aspects of center provider KAP in determining the quality of center environment.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by Amref Health Africa's Ethics and Scientific Review Committee ESRC, Kenya (Ref: P7802020 on 20th April 2020) and from the University of York (Ref: HSRGC 20th March 2020). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

MN co-led funding acquisition, study conceptualization, investigation, methodology, manuscript preparation, project administration, supervision, participated in data curation, formal analysis, reviewed, and edited the manuscript. NL led data analysis, curation, participated in project administration, and manuscript writing. LO participated in the project administration, data curation, analysis, and writing. KO participated in the conceptualization, investigation, methodology of the study, project administration, data curation, formal analysis, and writing review and editing. RM participated in project administration, data curation, and writing review and editing of the manuscript. MA-O participated in project administration, data curation, and writing review and editing of the manuscript. PK-W participated in the conceptualization, investigation, methodology, project administration, data curation, and writing review and editing of the manuscript. EK-M contributed to the design, supported project administration, and writing review and editing of the manuscript. HE led the acquisition of funding, participated in the conceptualization, investigation, methodology, contributed to project administration, supervision, analysis, and writing of the manuscript. MN, NL, LO, MK, PA, KO, RM, MA-O, PK-W, EK-M, and HE participated in the writing, reviewing, and editing of the final version of the manuscript. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

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Socio-ecological drivers of vulnerabilities of children living within orphan homes and the implications for their nurturance care

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At the heart of the Sustainable Development Goals (SDG) is the vision to “leave no one behind, and to see that all children survive, thrive and transform. However, some categories of children may remain left behind owing to their disproportionate exposure to the risk of threats and deficit of attention to the social and ecological climate that characterizes the various systems in which they are found. This study is concerned with one major question: Despite diverse local and international instruments that favor full nurturance and development of children, what social forces play as threat to full nurturance care in the context of children living in Orphan homes? Nurturing care framework and Brofenbrener’s ecological system theory were adopted as the analytical frameworks. Research design was exploratory. Data were collected through sessions of in-depth-interview with orphanage managers, caregivers, and social workers on the socio-ecology drivers of threat to children living within the orphan home space and its implications for nurturance care across the various complex systems of the child’s environment. The study found various factors across the complex systems of child development – microsystem, mesosystem, exosystem, macrosystem and lastly, chronosystem- which undermine caregivers’ delivery and increases children’s vulnerability and risk of missing out on effective nurturance care. These vulnerabilities are endemic realities of social, and bio-ecological space in which child development occurs. This study recommends specialized interventions and policy directives relevant for each identified threat. It also calls for a stronger political will in improving the conditions of this category of the children while within the orphan home space and ultimately, actions towards deinstitutionalization of children.

KEYWORDS

child protection (policy and practice), child vulnerability, child welfare, nurturing care, orphan home, Nigeria, SDG 16

Introduction

Children are naturally vulnerable because of their physical and psychological levels of maturity (1). However, some children are more vulnerable due to the condition of their care and protection. The vulnerability of children is contingent on the context of their development and borders on the cumulative exposure of a child to endangering factors (2, 3). The World Bank conceives of child vulnerability in terms of the responsive capabilities of a child’s household in preventing shock, reducing the effects of shock that may arise, as well as the capacity of a household to manage the same (4). The Children’s Commissioner for England defines a

vulnerable child as one at an increased risk of adverse outcomes (5). The commissioner identifies children as vulnerable when they are in state care or with any safeguarding concerns. In the same vein, the United Nations Children's Fund (UNICEF) and the World Bank Group consider a child as vulnerable when in residential care or exposed to adverse circumstances such as extreme poverty as well as experiencing moderate-to-severe disability (6).

In Sub-Saharan Africa, an estimated 0.65 million children live in orphan homes (7). Children live within institutional care, specifically orphan homes, for a host of reasons, one of which is the loss of one or both parents (8). Generally, orphanages are institutions dedicated to housing children whose biological parents or guidance are deceased or otherwise unable or unwilling to support their children's lives or needs (8, 9). Orphanages, therefore, house children who are in an irreversible state of abandonment or those who are there simply for care and protection until their parents are socially, physiologically, economically, or otherwise fit to cater to the care needs of their children.

Living in institutional care is highly detrimental to a child's growth and development. Children raised within institutional care suffer structural neglect (10) and are deprived of nurturing and stimulating environments that assure them of normal growth and healthy social and psychological development. Gunnar's three-tier classification of institutions is founded upon the quality of care provided to children and reveals that institutions are necessarily deficient by being characterized by global deprivation of the child's health, nutrition, stimulation, and relationship needs. In some cases, where institutions provide good health and adequate nutrition support, the children are often deprived of necessary stimulation and relationship needs. The last classification is institutions that meet all needs except for stable, long-term relationships with consistent caregivers (11). Building on these, Van IJzendoorn and colleagues logically added the fourth tier, where an institutional environment is able to provide stable and consistent caregiving; however, the children are only deprived of a regular family life that is characteristic of a regular social environment (10).

Across the globe, children living in orphan homes are at high risk of poor developmental growth (12, 13). They are known to suffer diversely owing to issues relating to unfavorable/unstable staffing conditions and poor physical resources and are vulnerable to the instability of caregiving and the paucity of human interactions and attachment that is required for the development of their human capacities (14, 15). This situation produces negative consequences such as retarded physical growth of children in residential care (16), delayed cognitive performance of children (17), and difficulty in securing attachment, as well as diverse internalizing and externalizing behaviors (18–20).

Global movements driven by children's rights to "survive, thrive, and be transformed" have called for interventions for the millions of vulnerable children who are at risk of not achieving their developmental potential. In response to this, the World Health Organization (WHO), UNICEF, and the World Bank Group launched the nurturing care framework (21) for early childhood development (ECD). Nurturing care is an intervention for many children who are at risk of not reaching their developmental potential. This practice is central to early childhood development. It creates conditions that enable communities and caregivers to ensure children's good health and nutrition, mental development, and protection from threats. The idea, philosophy, and practice of nurturing care have continued to gain traction as an important take-off point in garnering

multi-sectoral collaborations for realizing sound early childhood development (22). The practice is premised on five domains of care: promotion of a child's health, nutrition, security and safety, responsive caregiving, and opportunities for early learning (21). The nurturing care framework rests on universal health coverage and emphasizes the important place that all sectors occupy in the promotion of sound development of children.

However, despite the growing recognition of the role that investing in early childhood development plays in realizing future global transformations and charting a more sustainable path, some categories of children may be left behind. This is more concerning given that at the heart of the Sustainable Development Goals (SDGs) is the vision to "leave no one behind," specifically to see that all children survive, thrive, and transform.

In the provision of nurturing care, the home environment is foundational and holds a significant place in its successful delivery (23). Hence, for children who are out of their biological home setting, the organized alternate care system becomes the physical environment of importance for the realization of optimal child nurturance. African children are disproportionately affected by this adversity. An estimated 83% of countries where more than 60% of children are at risk of missing the developmental milestone are located in Africa (24).

Previous studies have identified poor parental care at conception, genetic conditions of biological parents, infections (e.g., HIV), poor child spacing, low maternal education, and parental violence as correlates of poor child nurturance care (25, 26). These factors undermine the family's capacity to provide nurturing care for their children. However, these factors operate within family settings. They do not explain the unique experiences of vulnerability among children in orphan homes. Previous orphanage studies on child vulnerability have reported on threats such as child neglect (27), child malnutrition (28, 29), depression, and anxiety disorder (30) as common with children living within orphan homes. These studies, however, do not explain the social and ecological factors that characterize these systems and how they interact to shape adverse child development outcomes. Hence, there is a paucity of studies that focus on how the social ecology of the orphan home space contributes to child vulnerability and poor nurturance care. Identifying these socio-ecological factors is important for developing interventions to reduce the risk of poor child nurturance and strengthening the services that children receive. The present study fills these gaps in knowledge by identifying diverse aspects of child vulnerabilities within the different scopes of the child's social ecology.

Conceptual framework

Bronfenbrenner's ecological system framework and the nurturing care framework were adopted as conceptual frameworks for the study. The ecological framework posits that child development occurs within a system of relationships that form a child's environment. Bronfenbrenner argued that the environment includes five different layers: microsystem, mesosystem, exosystem, macrosystem, and chronosystem (31). The microsystem is the closest unit to the child. It includes the home environment, school, healthcare system, and other institutions that have direct contact with the child. In the context of the orphan home system, the home environment and the immediate community in which a home is situated serve as the microsystems.

Hence, happenings within these close units could undermine or advance child development. In the context of orphan homes, issues relating to the social architecture of orphan homes and community members' ill-perception of children living within orphan homes adversely interfere with child nurturance care. The mesosystem explains the dynamic relationship between the structures of the child's microsystem. Within the orphan home system, the relationship between the representations of government (e.g., the ministry, police, court, and so on) and orphan home management) provides a suitable insight into the mesosystem. Examples of this include government orphanages' conflicting role expectations, caregivers' alienation by government officials, ecology of distrust, and so on. The exosystem represents the larger social unit in which, though children do not actively participate, they are greatly affected due to the considerable indirect influence it has on their interactions with any of the elements in the microsystem in which they are situated, for instance, caregivers' mental health, work stress, role conflict, job satisfaction, and so on. The macrosystem includes the cultural- and policy-related situations in which child development occurs. The chronosystem speaks to time constructs of events that are capable of affecting child development. It accounts for the fundamentality of time in a child's life and the major events occurring that are capable of explaining a child's development. For instance, a child's age has been found to inform chances for adoption, which should translate to a child's placement within a home environment and, ultimately, safety and security. Adopting the ecological framework allows an in-depth exploration into prevailing natural and situational child ecological circumstances that foster child vulnerability.

The nurturing care framework, on the other hand, presents an eclectic intervention across different aspects of child development needs. It offers opportunities for children to maximize their potential by creating an environment where they are responsively cared for, well-nourished, have opportunities for mental stimulation, and are protected from violence and diseases (32). Nurturing care comprises five interdependent components upon which its expected outcomes are built. These are good health, adequate nutrition, safety and security, responsive caregiving, and opportunities for early learning and stimulation. The nurturing care framework enables an understanding of child vulnerabilities within the different components of nurturance care needs. Data that emerge from this study report on four major components of nurturing care (good health, responsive caregiving, stimulation/opportunity for early learning, and safety and security). On good health, the child's mental and physical health were reported. These covered issues relating to affordability and access to healthcare delivery for children, as well as everyday events within the orphan home space that produce adverse effects on a child's mental health, e.g., adoption of peer. On responsive caregiving, issues within this domain relate to timely responses to the child's cues, care needs, and prompt and appropriate responses to the child's signals. On this, caregivers' role conflict and unhealthy mental state arising from work conditions or job dissatisfaction and care workers' alienation likely affect responsive caregiving. Opportunity for early learning refers to having an early opportunity to relate to things, people, and objects around them for their minds to be stimulated. Here, the child's age at entry might affect swift resilience from earlier trauma, which is capable of impairing children's minds, placement in age-inappropriate classes, and so on. Finally, with regard to safety and security, issues relating to cultural and state policy effects on child adoption, and ill-attitudes of community members to children living within orphan

homes, *inter alia*, explain the interactions between and within systems and adverse effects on procuring the safety and security of the children living within the orphan home. Taken together, these frameworks explain how happenings within and between different individual care actors and institutions that make up a child's ecology define a child's vulnerability, specifically in relation to the reality of procuring effective nurturance care.

Methods

Research design

The study used a qualitative research approach to gain an in-depth understanding of the vulnerabilities of children living within Nigerian orphan homes. Data were gathered with the use of semi-structured, in-depth interviews with orphanage managers, caregivers, and social workers. Thematic analysis was adopted to analyze the data.

Study setting

The study was conducted in Lagos, Nigeria. Lagos state was chosen given its relatively more organized structure of orphanages in the southwestern region. The state has over 70 registered orphanages and three government-owned orphanages. Matters regarding orphanages are regulated by the State Ministry for Youth and Social Development (hereafter referred to as "The Ministry or "the State Ministry"). Orphan home is used to describe "any residence or home maintained for the reception, protection, care and bringing-up of more than six children apart from their parents but does not include any school of industries or reform schools" (33).

Samples and sampling procedure

The sampling technique for this study was purposive. At the outset of the study, approval was sought from the Ministry for data collection. Orphanages were included based on (i) the type of ownership, whether it was private- or government-owned and (ii.) the perceived level of establishment/development. In all, 12 orphanages, including 10 private orphanages (five adjudged by the Ministry as already well-established, and five that are considered as just developing), alongside two of the three government-owned orphanages in the state, participated in the data gathering. In all, 17 respondents were engaged, comprising orphanage managers/owners (OM), social workers (SW), and caregivers (CG) in orphanages located in Lagos, Nigeria. Interview sessions lasted an average of 50 min.

Data collection

Data were gathered with the aid of an interview guide, which was informed by the nurturing care framework developed by the WHO, UNICEF, and World Bank Group (21). The interview guide covered all components of the nurturing care framework. Items on this interview guide included the following, among others: Could you please share with me your experiences in terms of ensuring child's safety and security within orphan homes? What roles do the

communities play in promoting safety and security, good health, adequate nutrition, and responsive caregiving (nurturance care) of children? What is your take on the roles of government policies, rules, and regulations in achieving (mentioned the different components) nurturance care of children? What has been a major support to you in driving (mention the different components) nurturance care of children? Would you like to share any concern, personal or system-wise, that affects your care delivery? What major issues do you consider hampering effective delivery of (probed across the components) nurturance care? How observed irregularities influencing child vulnerabilities were also probed. Oral consent was given by the prospective respondents who had earlier been informed about all necessary details, including the purpose and modalities of the study. After the consent was granted, a convenient place and time for the interview were proposed by the prospective respondent. Before the commencement of the data collection, the study was approved by Bowen University Teaching Hospital Ethical Review Board, Approval no: BUTH/REC-647.

Data management and analysis

Thematic analysis was adopted given its aptness for this study, which aimed at discovering common themes and perspectives from the respondents on the constellation of socio-ecological threats to child nurturance (34, 35). The analysis of the data started with the transcription of interview records to generate transcripts. The process of data analysis was informed by the ideas of Granehein and Lundman (36). First, transcripts were read repeatedly to gain a clear understanding of the contents. This process of familiarization was followed by the identification of meaning units. Meaning units are a constellation of words or sentences having an intersection of meaning or aspects relating to one another in content or context. After this, a condensation of meaning units was done. Following this, data were collapsed into themes and sub-themes. Specific themes that relate to different ecological systems were first identified, followed by the sub-systems, and finally, common categories in meaning were grouped into themes. These groupings were based on happenings within each system, for instance, microsystem feature subthemes that relate issues to the child's microenvironment, such as homes and the community in which these homes were situated. Most suitable data were selected and quoted verbatim to support the findings. These quotes were labeled to differentiate between and within the categories of respondents. A caregiver was presented as CG, orphanage manager as OM, and social worker as SW. An orphanage manager was either the owner or one employed to oversee the affairs of the orphanage, while a social worker was either one employed by a private orphanage or a civil servant working with the Ministry. Numbers were also assigned to differentiate within the categories of respondents. For example, "SW1" means social worker 1 and "CG2" means caregiver 2.

Rigor and trustworthiness of the study

The rigor was achieved through a number of procedures, such as member checking. This was done during data collection by intermittently summarizing the respondent submission and confirming from the respondents if it captured their opinions. This

was done to ensure the intent and original contents of the respondent's views were captured and preserved. Rigor was also achieved through reflexivity and prolonged contact with the respondents to aid understanding. Reflexivity was also deployed through the inclusion of emerging themes that were not originally captured in the interview guide for subsequent interviews.

Credibility or trustworthiness was achieved first by recruiting relevant research participants who are on the frontline of procuring nurturing care of children in orphan homes. Saturation was reached at the 10th orphan home. The credibility of the study was also established by choosing suitable meaning units that ensured no exclusion of important data as well as no inclusion of irrelevant data. For instance, under the microsystem, the social architecture of orphan homes was a suitable meaning unit that accommodates issues relating to the symbolic spiritual significance of orphan homes as well as the issues with porosity and negative external influences, while the "home-inherent emotional trauma" meaning unit was suitable for trauma arising from sudden removal/adoption of a child's close peer, and other forms of trauma such as arising from preferential charity attention or when they realize their selves as orphans. Finally, the trustworthiness of the study was assured by presenting the findings with appropriate quotations that allow the readers to give possible alternate interpretations (36).

Results

Participants' characteristics table.

SN	Label	Role	Gender	Home type by ownership
1	OM1	Orphanage manager	Female	Private
2.	OM2	Patron	Male	Private
3.	OM3	Orphanage owner	Female	Private
4.	OM4	Orphanage owner	Female	Private
5.	OM5	Matron/nurse	Female	Private
6	OM6	Matron	Female	Private
7.	CG1	Caregiver	Female	Private
8.	CG2	Caregiver	Female	Private
9.	CG3	Caregiver	Female	Government
10.	CG4	Caregiver	Female	Government
11	CG5	Caregiver	Female	Private
12.	SW1	Social worker	Female	Private
13.	SW2	Social worker	Female	Government
14.	SW3	Social worker	Male	Government
15	SW4	Social worker/nurse	Female	Government
16	SW5	Social worker	Female	Private
17.	SW6	Social worker	Male	Private

This section presents the study findings. Here, diverse aspects of child vulnerability are presented using the ecological system model. The implications of the different aspects of vulnerabilities were drawn regarding the nurturing care framework. Given that

researchers have responsibilities to safeguard and protect these children, based on the study inferences, the researchers are in constant touch with the home in the form of seminars to relate the findings and spot areas where focused attention is required to improve child care delivery.

Microsystem

The microsystem refers to institutional (i.e., orphan home-related) threats to effective nurturance care of children. It also covers children's vulnerable experiences within their immediate communities. The social architecture of orphan homes exposes children to health threats and negative external influences. Sources of vulnerabilities within this setting include the inherent nature of care, which is generalized, conditional, and commercialized. Observed vulnerabilities at the community-level subsystem include ill-perception of orphan homes and children living within. These are discussed in the following in greater detail.

Social architecture of institutional homes as a threat to child's safety and health

On the social architecture of orphan homes, the symbolic significance of orphanages as a social and spiritual space attracts a wide range of individuals and groups to the home, creating situations of child vulnerability to health hazards. Several care actors mentioned this. For instance, an orphanage manager identified a home-related risk that threatens children's health:

...you know visitors come here and they want to play with the children, some, forgetting that they have communicable diseases... some do not even know, and they still come in contact with the children. OM4/Female/Private.

Moreover, by social design, orphan homes expose children to negative external influences that make them vulnerable to ill behaviors. Orphanages are socially porous, given the way they attract different categories of people with all kinds of appearances and attitudes, leaving some unpleasant impressions on the minds of the children:

Things should be stable, but they cannot be stable because this is an open place where different people come in and go out, and different people with different characters come in contact with these children, and this is a challenge CG1/Female/Private

...Also, the way visitors dress can influence the children... Immediately such visitors leave, we tell the children that whoever dresses this way or does one kind of hair or tattoo is not right SW6/Male/Private.

Some respondents noted that sources of negative influences included grown-up children who had developed anti-social behaviors before entering the orphan home and adults who worked within the home. A social worker narrated a story:

We used to give our children snacks to go with to school; there was this grown-up girl who used to collect the cakes from other children to sell...Last month, I declined to hold custody of a 13-year-old because we don't want a situation whereby, they will be coming to teach those children what they are not supposed to learn. SW6/Male/Private

Generalized and commercialized care within orphan homes: threats to responsive caregiving

Vulnerabilities of children may also be home-induced owing to generalized care, with its resultant poor one-to-one parent-child interaction, as well as commercialized care, which characterizes orphan homes. This generally has adverse effects on a child's behavior and responsive caregiving. Some of which can be picked from the quotes:

There is a lack of personal one on one mother-child interaction. Although we do try our best here, however, there is something missing when the child does not have that biological family setting. Psychologically, it affects their behavior. This could make some children very hard to deal with. Every person that comes, the children feel like, maybe this is their mother, maybe that is their mother. They experience attachment disorder OM4/Female/Private.

If they stay longer in the home, it will affect them. And there is nothing you can compare with one-on-one care, you know, here, we give generalized care. But at a regular home, the child will know that this is my mummy SW5/Female/Private.

The need for primary caregivers necessitates the commercialization of care. However, this is potentially threatening to the safe and sound development of these children. For instance, commercialization hampers good care by making care conditional. Commercialized care provides a pathway for individuals who lack expertise or organic interest in child care to opt for such a sensitive job when pressured by the need for economic reward. One of a few respondents who identified with this view submitted:

You know that sometimes, people who are employed in this kind of place just want to work because there is no job out there... Taking care of children is not like handling files, a file can fall and you pick it, once you don't take proper care of a child, it might be difficult to rectify such a mistake CG2/Female/Private.

With regard to conditional love, children living in orphan homes are not always as fortunate as their counterparts living with their original parents; this is given the differences in the degree of attachment that characterizes both categories. Attachment figures in the lives of children are the primary caregivers that protect them from threats. However, attachment between a child and parental figures varies between a social and biological parent-child relationship. The natural bond that exists in a biological parent-child relationship is observably difficult to attain in adoptive or social relationships. An orphan owner remarked:

Sometimes, caregivers recommend to me that we return children to the ministry because they are stubborn, “transfer this one because he is a problem, we cannot cope”. I don’t listen to them; I ask that if they were the ones who gave birth to the children, will they return them OM2/Male/Private.

Home-inherent emotional trauma impairs the child’s good health

Home-induced vulnerabilities may also materialize in the form of preferential attention that children within the home receive. The opportunities and acts of kindness received by children are different and are likely discernable to other children who receive little attention of philanthropist interest, thus communicating that some children are somewhat preferred:

A child, say, at age two or three years, at times observes when an intending adoptive parent is interested in another child. When an intending adoptive mother is interested in a child, the child plays with the prospective mother in that period of bonding, and he or she goes back to his/her room, that child is different from others, despite the fact that they are together because he or she has somebody that is coming to check up on him or her; he or she sees that person as a parent at that moment. SW2/Female/Government.

Another popularly mentioned source of threat within the home is usually recorded when a fellow child is being given up for adoption. These subject some other children to trauma:

... The sudden removal of a child exposes the remaining children to post-traumatic disorder, and for the adopted children, there are times there is no bonding opportunities. OM2/Male/Private

The statement of a social worker from another home further buttresses this point:

When they see part of their friends leaving, they will now begin to ask questions, “When am I going?” ... imagine that five children are together and then, suddenly, one of them is leaving and there is no explanation for it. They’ll feel bad SW6/Male/Private.

Narrating children’s ordeal at this time, a social worker said:

... let’s now talk of the day the adoptive parents will now come for that preferred child, and the child is released to them, those ones back there will feel bad if they don’t see that child again...See, we’ve seen a scenario whereby a child is released to the parents and some of them will just sit down and start screaming, ha! ha! “When will my mummy come”? ...There are some that by the time those peers leave, psychologically, they will misbehave...you understand? But if you don’t understand them, you will feel they are possessed; they are not. They are affected...you might just see one of them that has understood what is going on will just go and sit in one corner. A child who could easily go to the toilet by herself will just stay there and poop on his/her body; she is frustrated. No one will know except you understand her. There’s one child upstairs now, most of the children who came here together have been adopted, so at times, she will just switch, at

times, the caregivers will not be able to understand her...She knows this one and that one has gone, so she feels, “what am I doing here?” SW2/Female/Government.

Public/community perceptions of orphan homes and the spiritual significance of orphans as threats to safety, health, and mental stimulation

Microsystem analysis of vulnerabilities revealed issues at community sub-systems that border on community members’ perceptions of orphan homes and the children within them. Given the cultural belief in giving to orphanage children and the fact that the majority of orphan homes rely on philanthropists and the general public for their sustenance, children may be vulnerable to charity fatigue. Respondents reported having experiences in which donors leave some undesirable conditions of donating, such as having physical contact with the children for prayers, sometimes in a manner that conflicts with the best interest of the child. Meanwhile, in some cases, failure to meet such conditions given by prospective donors led to the withdrawal of their intended support.

Some intending donors, for selfish interest, will request that all the children be brought out to pray for them, as they believe that prayers of such children are always heard by God...OM4/Female/Private...When you don’t allow them, some will rather carry their thing and go OM6/Female/Private.

Moreover, some orphanages, as a response to the educational needs of children, established schools for the children in their custody. Given the need that orphan home children have to integrate with other children, these schools are made open to other children within the community. However, community parents respond to this sometimes in a manner denigrating the status of these children living within orphan homes. For instance, some parents reportedly questioned why their children should attend a school established for orphans:

When I started the school, I called it an orphanage school, the community members did not want to bring their children. They said that they are still alive. So, I changed the name, and they started bringing their children. OM2/Male/Private.

Another orphanage owner corroborated:

Our agent told me that when she was advertising the school to some parents, they said that they learnt the school belongs to the orphanage; orphanage school, and orphan children, abandoned children, are going to be in the school, so for that reason, they were not bringing their children. That was the first time I heard such shocking words. OM3/Female/Private.

Another orphanage manager spoke of how orphanages and the children may be conceived by some community members as a dumping ground for unwanted items, even expired foods:

You know, there are even some of them that come in with items that are almost expired and you know...it’s a lot. But we are coping, we can’t complain, we are coping OM6/Male/Private.

Mesosystem analysis of vulnerabilities in orphan homes

Data analysis on the interactions between microsystems reveals diverse aspects of vulnerabilities and threats to child nurturance. At the mesosystem, different components of nurturance care suffer, making the child vulnerable, owing to conflicting role expectations, ecology of distrusts, government–home conflicting childcare ideologies, politics of child adoption, care workers' alienation, and officials' apathy. Each differently puts children in vulnerable conditions. These are discussed below in greater detail.

Government-orphan homes conflicting role expectations: threat to all nurturance care components

Conflicting role expectations involved financial responsibilities between the government and private orphan homes. Government agencies saw orphan homes as a non-profit organization that receives grants from donors for children's upkeep. On the other hand, the homes, specifically the private ones, lamented over the government's neglect of the children and institutions in the face of hardship. This was more concerning for them because children living within orphan homes are widely referred to as the government's children. These struggles implicate issues of health procurement, requisite facilities for child development, and education, feeding, and general care needs of children. For instance, even when an abandoned child is newly found, orphanages are made to be financially responsible for all medical investigations before taking custody of the child:

...Like now, we will always need to do general check-ups for newly found babies...also, children with special needs use a lot of drugs, and that is to manage their health. That is so costly SW5/ Female/Private.

We (orphanages) still pay some bills. The government needs to come up with a policy that the treatment of children from orphanages has to be free. Our Matron took a child to the hospital, and they told us, we have to pay forty thousand naira (approx. 80 dollars). What is the essence of the insurance scheme if you are asking us to pay? The homes are helping the government to reduce future problems; the children are the government's responsibility. Government looks at us as profit-making entities...they need to fund orphanages for the betterment of t society. No home can single-handedly cater for children SW6/Male/Private.

Still on procuring the health of children, many reported on how the government's health scheme for children does not cover critical health issues. A caregiver stated:

It hasn't been easy at all, because, you know, even if you go to government hospitals, they will not give you drugs for the children; we have to source funds to buy their drugs Recently the State government decides to pay for a health scheme... however, they said severe health issues are not paid for; if the child has malaria, or maybe catarrh, simple things, that's what they pay for SW1/Female/Private.

All of the respondents from different private homes lamented over the neglect of orphan homes by the government, yet receiving

pressures from the ministry to respond to the care needs of children even when the adoption charges go to the ministry:

All these facilities they said we should have; it's money to get them. You must have a standing social worker on board, have a bus, a sick bay... they said, "the net was torn, repair it". One day, I asked them, "Did you give me money to do all these?" ...OM3/ Female/Private.

Noting that the relationship between the government and homes over matters of the children is more parasitic than collaborative, an orphanage owner sadly noted:

... The challenge is the government's high-handedness. Supervisory organs highly handle their services, and they don't look into what we pass through. It's a relationship of demand without supply, and it is a very bad one. We call it a partnership, and under the partnership, one party must not gain unlimited power OM2/Male/Private.

We have seen how weak our government is, so, I do not look at them at all, because they do not love the children. Whatever they are doing is just for the income it will generate for them. You say you are the owner of the child, but you do not provide anything. We have so many staff to pay for. The government will say, as a home, we need to buy an ambulance, we must have a big generator, they say, we must have a doctor and a trained nurse. We must have a social worker. If the children are quite much, we must have a particular number of social workers. Meanwhile, you must have to pay the social workers every month. Where is the money coming from when you are the one collecting all the adoption money? OM4/Female/Private.

The government's neglect of orphan homes, along with the misappropriation of funds generated by these homes, affects childcare management by imposing pressures on the system. The pressure manifests to threaten effective child nurturance in diverse ways. For instance, children become vulnerable in the situation of caregivers' rash responses, thereby resulting in the disruption of responsive caregiving. The financial pressure has the capacity to create a situation where care actors become unscrupulous to meet children's financial needs. This orphanage owner warns:

These carefree attitudes of the government could affect the children in homes in diverse ways. The orphanage owners are frustrated and could even transfer the aggression onto the children or anybody around them. The orphanage managers may not be able to put in the best...As a government, you don't provide any of those things, you are looking for trouble because you are telling them, "You are on your own, it is either you sink or you swim ...Then, if they do that, most of the stories you hear about people selling children to make money would be far less. OM4/Female/Private.

Caregivers' alienation: the disruptive influence on child's safety, security, and responsive caregiving

Further analysis of sources of child vulnerabilities at the mesosystem and its influences on children revealed orphanages/ caregivers' alienation. Several homes spoke of being relegated to

nothing in the consideration of major issues that affect the welfare of children. For instance, orphanage managers and their staff reported feelings of alienation, in which, after they had devoted themselves to care of the children, even as frontline caregivers and sole financial benefactors, they are usually not carried along by the Ministry when a major decision such as adoption is being made over a child:

... what we suffer most is the attitude of treating the home as non-existent, not caring for the kind of impacts it could have on the child. They treat us as if we don't exist. For instance, the courts don't like to hear from the home about the child; they will rather hear from the ministry. They treat the home callously. They don't care the children are raised there. These children are here throughout the day and night, interacting with the people you are looking down on. The funds you get, you dispose of the home of it. You make them beg for everything... In actual fact, one of the government officials referred to the home as a warehouse in one of our meetings. He said, "Look here, you don't have any legal right over these children, you are just a warehouse. We keep our children there, and we take them when we want". OM4/Female/Private.

Orphanage owners mentioned the demands of raising each child as well as the bond built over time. They decried being deprived of the opportunity to contribute to major decisions such as the adoption of the child:

Do you know what it takes to raise a child to a year or two thereabout? And that child will just be picked and just go from there... Everything is purely decided by the government... there was one they adopted, the ministry officials just came and told me that they are coming to pick up the child... just like that? ... Can you count the cartons of milk you gave to the child? Can you count the cartons of diapers? Can you count the medical bills you paid? the sleepless nights, the care, when the child was ill that you were afraid and prayed for him/her to survive...OM3/Female/Private.

In addition, the frontline caregivers and orphan home managers felt alienated from the children they raised and cared for and were not being granted a hearing by the court on matters of the welfare of children in their custody. Apart from the feeling of alienation, some shared a common view that, given the politics of child adoption, children became vulnerable in cases where ministry officials have a vested interest in an intending adopter. This is considered potentially disruptive to necessary adopters checks and, ultimately, the child's safety and security:

One major problem we face is that we are not given the opportunity to take matters to court directly; we have to take the matter through the probation officer in the Ministry. The Ministry does not know the children more than us and they want to speak for us ... The probation officers that are allowed to speak are working for the Ministry. Hence, if there is personal interest in the matter, the probation officer can change the matter; serving their interest, not the interest of the child. So, where is the justice? OM2/Male/Private

Issues raised on alienation also covered the issue of post-adoption checks. Some raised concerns about how the ministry alone, and

never the home, could check on the child after adoption. Meanwhile, they noted that the ministry rarely does these checks. This also raises a question of ascertaining the security of children who are given up for adoption:

They reserve the right to post-adoption checks to them and not to the orphanages; we are not involved. So, their activities are not transparent to us, in the selection, in the recovery, and these are children who did not put one dime in their care OM2/Male/Private.

Politics of adoption: threat to child's safety and security

Another driver of child vulnerability relating to the mesosystem is the politics of adoption, which makes a child vulnerable to unscrupulous intending adopters. This politics creates a market that is driven by financial interests and does not consider the child's best interest. In reality, orphan homes have a list of intending adopters with an approval letter. However, these homes often receive calls to match a child with an unfamiliar intending adopter who has not gone through the requisite procedure. A common complaint is that orphan home care actors are often unaware of what is going on at this stage. This situation robs care actors of the enthusiasm to do more for other children. An orphanage manager report:

How do they (ministry officials) take care of the interest of the child when there is bias? When there is even a gang up and a scheme to manipulate in favor of their bosses (who have a special interest in some intending adopters) rather than the consideration of the interest of the child ... They do anything they like; they pick our children for adoption arbitrarily. Sometimes, you don't even know what goes on. You don't even know the adopters. You don't know whether they take them for rituals, and they don't allow you to follow it up OM2/Male/Private.

Referencing the children as the ones who suffer from these irregularities of adoption, an orphanage manager reported the diversion of adoptable children from those who have been approved to another person of interest to the adoption officials. This reportedly happens without the knowledge of orphan home officials and discourages the interest of caregivers in further committing to the care and protection of the children:

The intending adopter that is preferred may have more knowledge of what is about to happen than you that has raised the child, and I am like, I have a list of people that have been on approval. Before you know it, they have handed the child over to the person of interest to them. When the next child comes, how would you feel? You will be a bit reluctant because it is like you are a nanny. Even nannies are paid now. That kind of treatment is just one example. So, the relationship between the home and the government is not cordial; it is very poor. Hence, when elephants fight, the grass suffers OM3/Female/Private.

Ecology of distrust: a bane to diverse components of nurturance care

Finally, on the mesosystem examination of children's vulnerabilities in orphan homes, an ecology of distrust was discovered.

This affected almost all the components of the child's nurturance. Respondents mentioned the issue of distrust as a tragedy waning the necessary concerted efforts of care actors in manifold ways. Issues of distrust further complicate child vulnerability as it gives rise to donors' conditional donation, failed efforts of caregivers to conduct post-adoption checks, and also explains the state Ministry's antipathy toward adopters–orphanages' rapport.

The following observation of an orphanage owner describes this ecology of distrust:

Another big tragedy that is affecting child welfare in the country and the state is distrust. The government does not trust orphanages; orphanages do not trust the government. The police don't trust the government officials. The government official and social workers don't trust the police. The Court Magistrates don't trust the Ministry, Ministry doesn't trust the police, and the police don't trust the home...OM2/Male/Private.

Orphanages are established as platforms of immediate protection for children. Although orphanages are transitory in nature, children within need funds for survival and transformation during the period of their stay. Moreover, given its non-profit orientation, the majority of orphan homes absolutely rely on philanthropists and the general public for their sustenance. However, respondents reported cases of distrust that sometimes affect donors' discouragement. For instance, some would request that children in the home should come out for them to see for fear of being swindled by orphanage operators. An orphanage matron noted:

Some of them (potential donors) feel that maybe the officials usually cart away whatever they bring...or maybe there are even no children in the home. OM6/Female/Private.

Based on her experience during the COVID-19, when she needed to reduce children's contact with visitors, an orphanage manager recounts a story:

These donors have one thing in mind; they tell you 'Bring out the children that we are donating for'. If you say, oh, this pandemic will not allow us to bring the children out, they will not agree with you because they also are afraid... nobody wants to sow into a deep sea that is swallowing their donation. OM4/Female/Private.

Still, on the issue of distrust, an orphanage manager reports an experience she considered unacceptable in the bid to perform necessary post-adoption checks, in the bid to perform necessary post-adoption checks:

The child was adopted and I have not been able to communicate with her adopters because each time I called them, immediately they hear my voice, they will switch off the phone and I do not know if they are thinking I am calling to ask for money or whatsoever. I have texted them but there has not been any reply so since then I have stopped because I have tried my best. OM1/Female/Private.

A majority of the respondents were of the opinion that state ministry officials played a significant role in breeding distrust between

the orphanage homes, especially private homes, and the intending adopters. Orphanage actors recounted different situations where this happened. One noted how her concern for conducting post-adoption checks to ascertain the child's welfare was condemned by the ministry and interpreted as a threat when an adopter who was averse to post-adoption checks accused the orphanage manager of threatening her parenthood:

They summoned me and started asking me why I was threatening somebody's parental skills. "Do not you know when a child is taken away from your home, you do not have the right to even say anything, whether she's okay or not? She (the adopter) is capable OM3/Female/Private; ...Every effort you make is criminalized. OM2/Male/Private.

Furthermore, on the ecology of distrust, most private orphanages are not self-sustaining and rely on charity in the face of the government's negligence. An orphanage owner complained bitterly about the government's failure to ease their financial burden or at least disburse proceeds from adoption charges to the orphanage. Some condemned the ministry for failing to establish schemes or float policies that foster healthy support for the orphanage but rather serving as an antagonist to receiving help from the intending adopters. She expressed this concern:

The Ministry is the one collecting all the adoption money. You collect them and tell the adopters not to give us anything. They actually instruct them: "these are government's children, once you pay the adoption charges don't let any home tell you any story; those homes are very crafty. They want to sell the children to make money". So, when you as an adopter hear that, you just come to the home to ask, "Where is the government child, give me and let me go". They are not helping in any way OM4/Female/Private.

This ecology of distrust makes children vulnerable in countless complex ways and across the nurturing care components. This includes a lack of funds to cater to various social and healthcare needs of children.

The exosystem and threats to effective nurturance care

The exosystem represents the larger social unit. Although a child does not actively participate in this system, they are greatly affected positively or adversely by this system due to the influence it exerts on children who interact with any of the elements in the microsystem in which a child is located. The exosystem, among other things, speaks to issues that concern the mental health and stability of caregivers.

Caregivers' role conflict/dispiritedness: threat to responsive caregiving

In this study, evidence that aligns with this reveals that caregivers' role conflict and care workers' dispiritedness threaten effective, responsive caregiving. On this, some respondents mentioned how it might reflect workers' characteristics such as age, experiences on the

job, family characteristics, and reproductive age status. These are likely to have spillover effects on the quality-of-care delivery:

I think in an institution like this, anybody that will work here should be someone that has experience in taking care of children; not that they will bring a young girl to work here, because... they are not patient. They want to go to the beach, go here and there; the effects go to the children, but as a mother, a grandmother, you know you have to give these children all your attention, you know that anywhere you miss it, it tells on the child as they grow up. Sw4/Female/Government.

Similarly, caregivers' conflicting roles might affect the care children receive in orphanages. A caregiver advised that older women are more suited to provide undivided attention to children in their care. In her words:

My children are grown up, so there is nothing that I will say I want to go home to do, I want to go home and cook for them, I want to go home and take care of them? They are all grown up. But in a case where you have a nurse that is still under child bearing age and newly married the attention is usually divided. CG4/Female/Government

The implication of this counsel may be seen in the quality of responsive caregiving that children receive. Similarly, caregivers' poor family communication and lack of social support also relate to effective, responsive caregiving. Some orphan home mothers discussed how effective communication and social support within their biological home helped to foster optimal care delivery:

I usually make my children understand that just as they go to school and have a time for closing, I also have to go to work and come back when it's my closing time. OM1/Female/Private.

An orphanage manager speaks of spousal social support as helpful in averting role conflict:

...It doesn't in any way because my husband is very supportive. So, it's the same way I will treat my biological children that I will treat these children OM6/Female/Private.

Still, on the exosystem, co-worker's non-compliance might discourage those who aspire to excellence in their roles:

When you are trying to correct people working, and they are like, what is she saying? Do you understand? In your own way, because of your level of exposure...at times it's not only them, it might even be your boss and you are trying to explain something to, and they are being adamant about it, or at times, when there are innovations, and you are trying to bring it in, and you are feeling frustrated, you know that you, yourself will be psychologically affected OM2/Male/Private.

The major source of discouragement is the nannies, you know...a lot of them come in here and they are like, "we have passion for children", but when they get in here, it's something else they do.

Some even abuse the children emotionally...if you say you have passion for children, then, treat them like children, not that you won't even listen to them, you punish them at will and you are not trying to understand each child with her/his own peculiarities OM6/Female/Private.

Negative attitudes toward children may be attributed to workers' dissatisfaction. The care of children entering the orphanage calls for the services of paid primary caregivers who protect them from threats. However, the commercialization of care is potentially threatening the safe and sound development of these children. For instance, a change in the condition of services is also likely to produce dysfunctional consequences on the quality of care delivery. Respondents reported the different ways in which these manifests affect responsive care delivery. Some explained this conditional care as fostered by poor economic situations that pressured caregivers into opting for such sensitive jobs as child care where they lack the interest or expertise. An orphanage owner submitted:

You know that sometimes, people who are employed in this kind of place just want to work because there is no job out there... Taking care of children is not like handling files, a file can fall and you pick it, once you do not take proper care of a child, it might be difficult to rectify such a mistake OM2/Male/Private.

...it's more about the money they earn... It's this money factor. They are just out to make ends meet, not because they love these children. They seek for employment to take care of themselves. They tell you they have passion for children, but when you employ them, they do something else...If we relate with these children on the same level, then we will be bringing out well-groomed nurtured, equipped, emotionally sound children, we won't have issues OM6/Female/Private.

The commercialized system of care produces adverse effects on child nurturance in situations of dissatisfaction of caregivers due to poor or delayed payment, absence of incentives, or in the event of organizational restructuring (e.g., downsizing). Workers' dissatisfaction generally lends to their lack of enthusiasm on the job, ineffectiveness, or workers' low commitment to work, however, the reality of this within a childcare domain is very concerning given the sensitivity of such a space as live-involving. A caregiver noted that her continuity on the job is driven by a lack of alternate options:

Some things that get me discouraged, but what do we do? This is due to the global economic downturn. The problem there is poor salary...The salary is too poor, and then, you will think, should I continue, should I leave the job, and then you will think if I leave, "what else will I do?" CG1/Female/Private.

... that is why at times you will come here and tell a caregiver to do this and she will be frowning at you, you will not blame the person, somebody that has not slept for the whole day, and at the end of the day, they will just think, "how much are we even collecting, how much are they giving us?... SW2/Female/Government.

Commenting further on this, a social worker identifies this problem as a pathway to ineffective nurturance care of children:

Staff welfare is very important, in terms of salary and bonuses to encourage the caregivers to work very well. If you are not happy, there's no way you can work effectively. For instance, I'm a caregiver, and I don't go home for a week, that sacrifice is fair enough...such a person needs to be well motivated. If you have a nanny and you don't motivate the nanny, your child will suffer, talk less of someone that is now taking care of 4, 5, 10, 15, 20 and 25 children SW6/Male/Private.

Downsizing also means that duties may be more burdensome for those retained.

...with the poor economic situation of the country now, we have to downsize the number of staff here. That was what they did so that they will be able to pay salaries to the few ones left...SW4/Female/Government.

The macrosystem and vulnerabilities of children living within orphan homes

The macrosystem takes account of cultural- and policy-related situations in which child development occurs. Some unfavorable religious and cultural beliefs could hamper children's chances for effective nurturance care and the optimal development of children in orphan homes. Children living in orphan homes are sometimes vulnerable to some cultural outlooks that define and redefine their significance within cultural groups. For instance, African cultural values for women's fertility and childbearing create a natural demand, and sometimes, in a spirited manner, a "market" for children where infertile individuals may clandestinely manage their infertility. This earns infertile women social validation even through the state system of adoption. This situation creates an opportunity for shady practices capable of jeopardizing the concerned child's security and safety.

Cultural outlook to child adoption—threat to safety and security of adoptable children

Child adoption was originally designed as a life-saving option for children in an irreversible state of abandonment. However, its use as a strategy for managing infertility allows for intending adopters to choose a preferred child. This, in turn, creates a situation where some children are treated as "undesired" and are vulnerable to emotional violence. Speaking to the observed reality of cultural differences in the purpose for adoption, culturally, the majority of Nigerians opt for adoption to manage infertility rather than for altruism. A child's age and health history chiefly inform intending adopters' preferences. Thus, the act of adoption is culturally conditioned to meet the esthetic and functional demands of the adopters; hence, some children are not desired locally. An orphanage owner remarks:

If you are here, occupying this seat, you will see how our culture is limiting us. It is a shame... What kind of love do we have in Nigeria? I am sorry, I have seen it all here; very selfish love, conditional love. If a child does not have long hair, if you are not

fair, I cannot take you... conditional love. The White people do not care. If you see those coming to seek to adopt HIV positive children, you will begin to ask yourself, am I a good human being? This job has humbled me greatly. Nigerians do not have love... they are so mechanical in their love approach. The White man that came to adopt one of our children that is reactive has already a Nigerian daughter he adopted that is deaf and dumb. He said, "Do you know I adopted one earlier that is deaf and dumb? Then, I am coming back because I want to help another." That White man had to learn sign language because of her. How many Nigerians would come here to take a child with special needs? ... Some others would turn the child around, and would complain... *Hey...E no get hair* (She is not hairy), in our family, we have plenty of hair. This one is too short... in our family we are tall... sometimes they yell at them...open your teeth! That is the kind of experience they have with Nigerian adopters, and the poor child would be looking. That is the slave trade...OM4/Female/Private.

State policy ill-attitude to inter-country adoption strains the opportunity for the child's placement for care and protection

The negative attitudes of representatives of the state to inter-country adoption of children do not favor children not locally desired, with resultant effects in children's prolonged stay in institutional care. While intercountry adoption has its risks and adversities under poor regulation, it may be a life-saving option and might provide opportunities for children to reach their full potential when they are not locally desired by intending adopters:

They should allow those children to go, Nigerians would not adopt any child with brain issues or a deaf and dumb child. These kinds of children would remain in the orphanage forever. Even the ones that are HIV positive get adopted by foreigners... I remember a child, when he came, you cannot stand his look; he had no teeth. He looks very ugly in the Nigerian way, but he's been adopted out of the country. The adoptive parents love him so much, they will kiss him, and show love to him in different ways. These children would have been left behind. Let them go and achieve OM4/Female/Private.

Chronosystem and child's vulnerabilities to poor mental stimulation

The chronosystem refers to time constructs of events capable of affecting child development. It accounts for the fundamentality of time in a child's life and the major events occurring that are capable of explaining a child's development. On opportunity for mental stimulation, some caregivers and social workers reported how the age of entry into the orphan homes determines a child's opportunity for resilience from earlier exposure to traumatic experiences when placed within a development-oriented and functional orphan home:

Children in the home have different backgrounds and some have not been to school before, some are children that were rescued, some are vulnerable children that came in from a very pathetic

situation, and have not even passed through school or have whatsoever type of education. We've had children in this home that were rescued from their mentally challenged mothers, for instance, while they were with their mothers, what they did was go to parties and pick the foods from floor. For those kinds of children, before you can stabilize them, it takes a whole lot, because, for a while, after giving them food, they will still pick the floor because they are fond of it... But for a child that came in like a day old to the orphanage, those kinds of children are sometimes almost perfect because you can give them the training from the beginning SW5/Female/Private.

The child's age of entry into an orphan home was reiterated by some orphan home managers, stating its implication on children's early enrolment in school, class appropriateness, and ultimately, the child's mental health in the group:

...Well, in terms of age specificity, the problem is an issue with older children who enrolled late in school, they get depressed, some were enrolled at age 11, and joined the home, say, age 8, meanwhile, they had not learnt anything before in their lives. So, when we ask them to go to school, they will have to start from kindergarten 1 or Primary 1, and they find children that are seven years older than in the same class, it affects them, and some do not cope. SW3/Male/Government.

Furthermore, the age of a child determines her or his chances of adoption. Meanwhile, the adoption of children is designed to serve to assure the growth and development of children in an irreversible state of abandonment by placing them within adoptive homes where their optimal development is assured. However, several respondents complained about the difficulty in placing children once they cross the preferred age for adoption. This is because the majority of those who now adopt instead do it to manage infertility. Some said:

Well, by the Nigerian standard, once a child can speak and know him/herself, people shy away from adopting such. Although there is some improvement these days, when they can't get days old babies, they adopt toddlers, after much persuasion, and pleading because they want the child to be settled, but still, not all of them will go. Anyone not adopted, you have to keep within the home. OM4/Female/Private.

We have a child of 14 years here, and the child has been here since when she was 2 years, nobody wants to take her since that time, even right now, we are looking for whom to adopt her, but we have not found any SW1/Female/Private.

Children who are older than the adoptive age might face the risk of prolonged stay in orphan homes and may become more vulnerable to poor care.

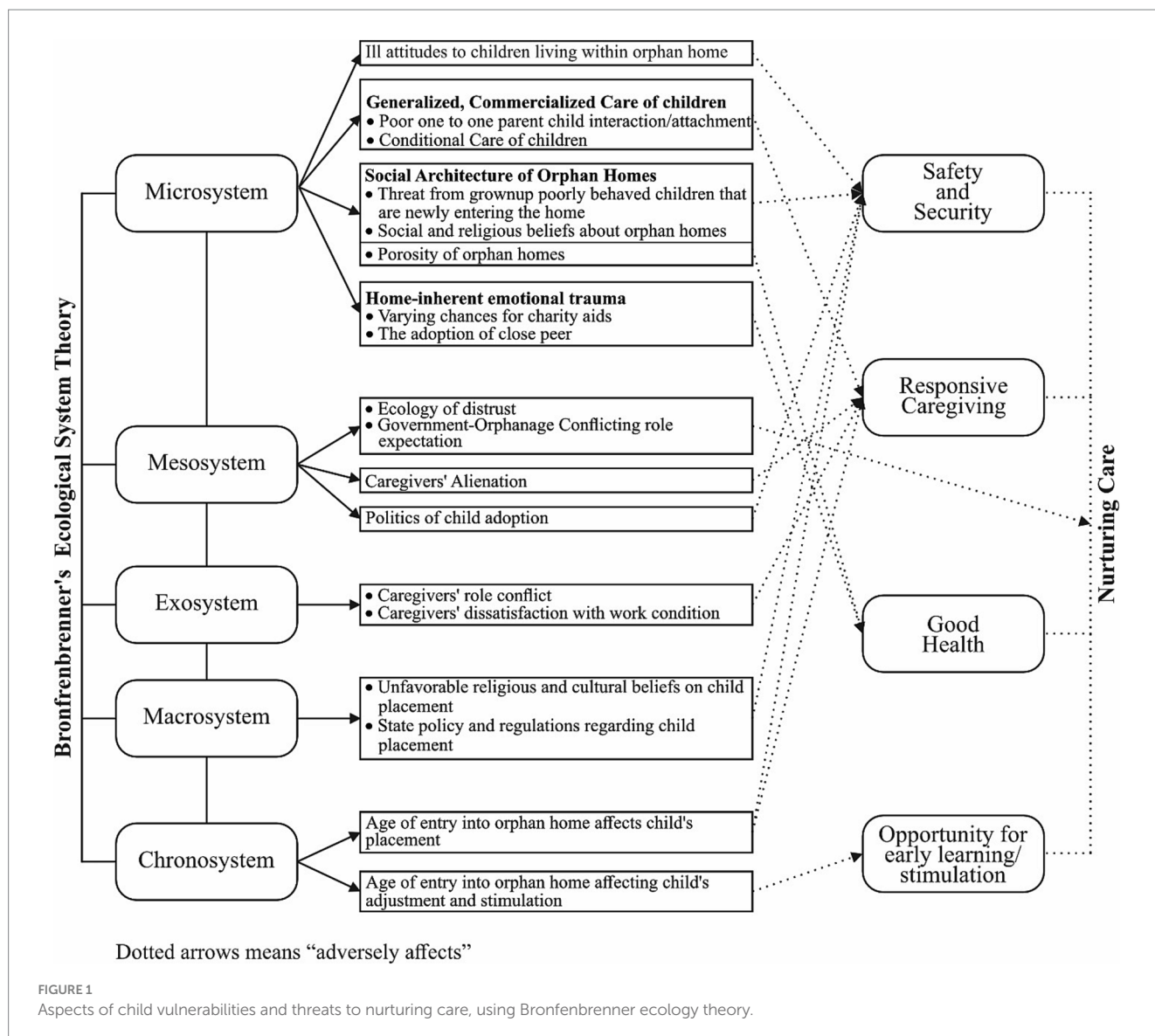
Discussion of findings

Socio-ecological drivers of vulnerabilities of children living in orphan homes cut across the various systems of relationship that form their nurturance care and development. These vulnerabilities are inherent parts of everyday realities, operations, and endemic social

forces relating to orphan home space. These include care workers' poor mental state, some state laws and policies regarding child welfare, commercialized nature of care, and social architecture of orphan homes, *inter alia*.

At the microsystem, we identified a number of threats to effective nurturance care. Institution-related threats included negative external influences stemming from the social architecture of orphan homes. These influences expose children to social and health risks due to visits made to this space by diverse individuals and groups. They also face threats from already grown-up children newly entering institutional care and also mental health threats from sudden removal of peers. In addition, the generalized nature of care that children receive in orphanages subjects them to some vulnerabilities and potentially threatens responsive caregiving (please see Figure 1). Observed vulnerabilities in the community sub-systems include negative perception of orphan homes and stigmatization of children living within these homes. The community's negative perceptions were also evident in parents' refusal to enroll children in orphanage-owned schools, leading to a feeling of stigmatization by the children. This study not only supports findings from previous works reporting feelings of stigmatization among the children (37, 38), but it also shows how this contributes to the stigmatization of the children. Previous studies (39, 40) have identified orphanage children and adolescents with emotional issues such as post-traumatic disorders. These early experiences of trauma could set the stage for the diverse emotional problems that are identified among children living within orphan homes in their later years. Although trauma arising from their identity is socially produced, it points to the ill-social construction of homes and the children within as "irregular." Hence, regularizing these children calls for deinstitutionalization.

Moreover, ensuring care for children entering the orphanage calls for the services of paid home caregivers. However, the commercialization of child care is potentially threatening the safe and sound development of these children. This is due to the conditional care offered as a service, which is often not child-centered. For example, some caregivers are pressured into taking up these roles by poor economic conditions. Some lack the interest or expertise to function effectively. This may be further aggravated by caregivers' dissatisfaction with work conditions. Van IJzendoorn and colleagues' (10) findings resonate with observations from our study that situates disruptive nurturance within necessarily commercialized care of children. However, they observed this as arising from high staff turnover and caregivers' shifts/vacations, all of which are markers of the commercialization of care. Furthermore, the attachment process and the nature of the bond that exists in a biological parent-child relationship are difficult to attain in non-biological relationships. This sets the stage for conditional care. Van IJzendoorn and colleagues (10) also observed that caregiving duties are made in a business-like manner. This supports our idea of care conditioning and commercialization of child care. This study shares similarities with that of Boadu, Osei-Tutu, and Osafo's study (37), which also observed children's difficulty in building an emotional bond despite caregivers' affectionate care. This observed difficulty instructs on the urgent need for deinstitutionalization. In recognition of the ills arising from the institutionalization of children across the globe, policymakers and major international instruments and entities (41–44) concerned with the right welfare and protection of children have continued to campaign for a family-based system of alternate care as against institutionalization.



At the mesosystem, different components of nurturance care suffer, thus making the child vulnerable owing to aspects of vulnerability such as conflicting role expectations bordering on financial responsibilities toward children's health procurement, education, and general care needs. Ecology of distrust, politics of child adoption, care workers' alienation, and officials' apathy were also identified with this component. The idea of nurturing care provides a suitable space for multi-sectoral collaborations for early childhood development (22). However, distrust undermines the concerted efforts of care actors. For example, such strained cordiality was reportedly intended by the ministry to forestall situations where orphanages place undue financial demands on prospective adopters. However, this functioned to obstruct opportunities for donation with resultant effects on all components of nurturing care. In addition, the strained cordiality arising from distrust poses an obstruction to post-adoption-check conduct by the orphanages, which threatened the security and safety of children that were to be stabilized by adoption.

At the exosystem, children were found to be vulnerable to caregivers' role conflicts (conflicting duty calls within caregivers' biological home, workplace, and orphan home), care worker's dispiritedness, which was

often a reflection of workers' lack of experience, and some caregivers' characteristics such as poor quality of family life of caregivers. However, effective communication and social support within their biological homes were reported to foster optimal care of children in their custody. However, engaging young folks with no childrearing experience was identified as a disadvantage to child nurturance caregiving as inexperienced young folks were often unable to give the required attention to children. Our findings agree with Bettmann, Mortensen, and Akuoko's view that the vulnerabilities of children in orphan homes are situated within the lack of requisite knowledge of caregivers in understanding children's emotional needs (45). This study, however, takes a further step to situate caregivers' knowledge deficit in lack of experience and an absence of organic interest in child caregiving roles. In terms of best practices, engaging older women who would give undivided attention to orphan home children is worth considering.

At the macrosystem, religious and cultural beliefs hampered children's chances for optimal development in complex ways. Children living in orphan homes are often vulnerable to some cultural outlooks that define and redefine their significance. African cultural values for women's fertility and childbearing create a market for children where

infertile individuals may clandestinely manage their infertility pressures, sometimes illegally, in a manner that poses a threat to children's safety and security through different shady practices that disrupt the opportunity to observe due process (46–48). This threat within the system of adoption has been connected to the observed gap between the high demand for children and the low number of adoptable children within the system, creating an opportunity for shady practices that threaten adoptable children's security and safety (13). Specifically, the spirited competition that results from this shortage potentially threatens the philosophy of altruism and humanitarianism that define orphanages by replacing it with infertility management (49). This shifts adoptable children away from the center of adoption practice in a manner that is capable of jeopardizing children's safety and security. Meanwhile, international and local instruments, for instance, the CRC, Art. 21 (50), and Hague Convention, Art. 19a (44), emphasize the consideration of the best interest of the child as paramount in all matters, including adoption-affecting children.

At the chronosystem, especially in regard to the opportunity for mental stimulation, this study observed that the age of entry into the orphan homes determines a child's chances of developing resilience against traumatic experiences. Similarly, it was observed that children are difficult to place in foster homes once they cross the preferred age for adoption. These children experience prolonged stays within the institutional homes, which increases their vulnerability to developmental threats.

Finally, this study has identified several factors within the ecology of child care and development that have the potential to interfere with the chances of effective nurturance. Given that most of these aspects of vulnerabilities were characteristics of their living condition and policies regarding their care, this study calls for political actions toward the deinstitutionalization of children. It also makes a case for responding to various home-induced vulnerabilities of children. Finally, it calls for specialized training and retraining of child care actors on managing the unique experiences of the children.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

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Ethics statement

The studies involving humans were approved by Bowen University Teaching Hospital Ethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

OO conceived the research, drafted the instrument, collected the data and analyzed and did the report writing. GH edited through the stages. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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