BMC Public Health

RESEARCH

Open Access

Caregiving experiences and practices: qualitative formative research towards development of integrated early childhood development interventions targeting Kenyans and refugees in Nairobi's informal settlements

Vibian Angwenyi[1*], Amina Abubakar[1,2], Margaret Kabue[1], Eunice Njoroge[1], Carophine Nasambu[2], Derrick Ssewanyana[3], Stephen Mulupi[1], Joyce Marangu[1], Eunice Ombech[1], Mercy Moraa Mokaya[1], Emmanuel Kepha Obulemire[1], Linlin Zhang[4], Greg Moran[5], Kerrie Proulx[3], Tina Malti[6,7], Marie-Claude Martin[3], Stephen Lye[3] and Kofi Marfo[1]

Abstract

Background Evidence is needed to understand factors that influence child development and caregiving experiences, especially in marginalized contexts, to inform the development and implementation of early childhood development (ECD) interventions. This study explores caregiving practices for young children in an urban informal settlement with Kenyans and embedded refugees, and identifies factors shaping these caregiving experiences, to inform the design and development of potentially appropriate ECD interventions.

Methods A qualitative formative study, which included 14 focus group discussions ($n=125$ participants), and 13 key informant interviews was conducted between August and October 2018. Purposive sampling approaches were used to select a diverse range of respondents including caregivers of children below three years of age and stakeholders of Kenyan nationality and refugees. Data were analysed using a thematic approach and the Nurturing Care Framework was used as an interpretative lens.

Results There was a fusion of traditional, religious and modern practices in the care for young children, influenced by the caregivers' culture, and financial disposition. There were mixed views/practices on nutrition for young children. For example, while there was recognition of the value for breastfeeding, working mothers, especially in the informal economy, found it a difficult practice. Stimulation through play was common, especially for older children, but gaps were identified in aspects such as reading, and storytelling in the home environment. Some barriers identified included the limited availability of a caregiver, insecurity, and confined space in the informal settlement, all of which made it difficult for children to engage in play activities. Physical and psychological forms of discipline were

*Correspondence:
Vibian Angwenyi
vibian.angwenyi@aku.edu

Full list of author information is available at the end of the article

commonly mentioned, although few caregivers practiced and recognized the need for using non-violent approaches. Some overarching challenges for caregivers were unemployment or unstable sources of income, and, particularly for refugee caregivers, their legal status.

Conclusion These findings point to the interplay of various factors affecting optimal caregiving for young children in an urban informal settlement with Kenyans and refugees. Integrated ECD interventions are needed for such a mixed population, especially those that strive to anchor along caregivers' social support system, co-designed together with community stakeholders, that ideally focus on parent skills training promoting nurturing care and economic empowerment.

Keywords Early childhood development, Formative research, Nurturing Care Framework, Qualitative research, Refugees, Urban health, Urban informal settlements

Background

Child survival and development are important public health goals and are part of the United Nations Sustainable Development Goals [1]. Millions of children under five years living in low- and middle-income countries (LMICs) remain at risk of not achieving their development potential [2]. Factors associated with poor developmental outcomes include poverty, malnutrition, the lack of stimulation, and other unfavourable environmental conditions [3, 4]. Children in urban informal settlements are especially vulnerable and are at a higher risk of poor outcomes. Children growing up in such environments experience multiple challenges, which pose threats to their survival, growth, and development [3, 5, 6]. These include high levels of insecurity, poor housing and sanitation conditions, which predispose them to infectious diseases and outbreaks, and poorly planned outdoor environments that constrain social interactions [3, 5, 6]. Empirical evidence suggests that interventions in the earliest years of life enhance preparedness of children, both academically and socially, and result in long-term benefits in the form of improved life outcomes [2, 7, 8].

The pace of urbanization has steadily increased in Africa in recent years. In 2022, 42% of Africans lived in urban areas; the figure was 28% in Kenya [9]. This exploding population and the corresponding proliferation of unplanned settlements are exacerbating urban health challenges [5, 10, 11]. The unregulated nature of urban informal settlements attracts and shelters pockets of hard-to-reach populations including asylum seekers and refugees. Kenya hosts a sizeable refugee population from its neighbouring countries in the Horn of Africa and the Great Lakes region [12, 13]. While there is established evidence on the health burden for native/host populations in urban informal settlements [14], there is a need for more evidence on migrant populations, particularly highlighting health priorities, and investigating sociocultural factors influencing the care and development for the young migrant children [6, 15]. Furthermore, there is a need to explore these factors more broadly to understand how they may promote or constrain parenting behaviour.

The Nurturing Care Framework for Early Child Development (NCF), launched by the WHO and UNICEF in 2018, provides a roadmap to operationalizing a set of best practices and evidence of effective interventions proven to work across different contexts, including in low-resourced settings [16]. The five building blocks of nurturing care identified in the framework serve as the basis to inform the design and development of early childhood development (ECD) interventions [16]. These include ensuring children's good health and adequate nutrition, security and safety, giving young children opportunities for early learning, and responsive caregiving [16]. A review by Zhang et al. [17], focusing on parenting interventions in low- and middle-income countries found that interventions which comprised elements of the Nurturing Care Framework had positive effects on child developmental outcomes such as language, cognition, and motor development. Similarly, a global review by Jeong et al. [18], showed positive effects on parenting outcomes such as parenting knowledge, parenting practices, and improved parent-child interactions. Efforts to design and scale up ECD interventions could however be undermined by contextual factors (including political commitment, levels of investments, community and stakeholders engagement, socio-cultural influences, among others), which need to be taken into account during programme design [19, 20]. In our previous household survey, we found that there were various sub-optimal indicators of nurturing care in this setting, including, poor infant and young child feeding practices, very low male caregiver involvement in child play and other learning activities, and poor child disciplinary practices [10]. Given the multitude of barriers and sources of vulnerabilities in urban informal settlements, it is imperative to conduct formative research in these settings to enhance contextual understanding of pre-existing caregiving practices, knowledge, challenges, and needs for caregivers of young children targeted as recipients of any form of ECD and parenting intervention.

This study aimed to explore caregiving experiences and practices for children below three years in an urban informal settlement in Kenya's Capital city, Nairobi. This particular informal settlement hosts nationals of different ethnicities and embedded refugees from neighbouring countries [21]. This study will contribute evidence to identify programmatic needs and inform the development of contextually-appropriate ECD and parenting interventions in the target setting. We use the Nurturing Care Framework [16], as a lens to explore and interrogate the qualitative findings presented in this article.

Methods

Study context

This research was conducted in the informal settlements of Dagoretti sub-county, Nairobi, Kenya. Dagoretti is further sub-divided into Dagoretti North and Dagoretti South, with a combined 10 administrative wards and the total population estimated as 434,208 in the 2019 national census [22]. This setting was selected for the presence of refugees, and the majority of whom are asylum seekers originating from the Great Lake regions and the Horn of Africa [12, 21].

This study was part of a larger formative research aimed at documenting and characterizing the general context of child development and child rearing practices in an urban informal settlement with embedded refugees and native Kenyans. Grounded in a social-constructivist perspective [23], the project's methodology combined qualitative exploratory approaches, a situational analysis, and a household survey - described in detail elsewhere [10, 12, 21], in pursuit of two core objectives. First, to explore a range of issues surrounding caregiving practices among parents and ECD stakeholders. Second, to investigate dynamics and needs within the population that could potentially inform the design of a package of integrated ECD interventions for the study context. Data collection methods included key informant interviews (KIIs) and focus group discussions (FGDs). Data were collected between August and October 2018. Using the Standard Reporting for Qualitative Research checklist, we report how this study was implemented and describe the researchers' positionality and reflexivity in the research process - see Supplementary File 1.

Table 1 Qualitative sample demographic details

Characteristic	Total (125 participants)
Focus group discussions (and category)	*N* = 14 (112 participants) ● 5 Kenyan mothers ● 3 refugee mothers ● 1 Kenyan father ● 1 refugee father ● 1 healthcare worker ● 2 community caregivers ● 1 community health volunteer
Key informant interviews (and category)	*N* = 13 participants ● 3 refugee leaders/representatives ● 2 local administrators ● 3 healthcare workers ● 5 community caregivers
Gender	Females: 100 (80%) in FGDs and 8 (57.1%) in KIIs Males: 25 (20%) in FGDs and 6 (42.9%) in KIIs
Mean age (range)	FGDs: 34.9 years (19–64) KIIs: 39.2 years (20–55)
Marital status categories (proportions)	FGDs: ● 91 married (72.8%) ● 33 single (26.4%) ● 1 widow (0.8%) KIIs • 9 married (64.3%) • 5 single (35.7%)
Proportion of respondents with children under 5 years	FGDs: 63.2% (*n* = 79) KIIs: 14.3% (*n* = 2)
Highest level of education	● 5 no schooling ● 29 primary school (completed or not) ● 44 secondary school (completed or not) ● 33 college/university ● 14 other (school system – A level)

** Replication from Ssewanyana et al. [24]

Notes: FGD, focus group discussion; KII, key-informant interview

Sample population and sampling procedures

The sampling procedures and sample characteristics have been described in detail in Ssewanyana et al. [24]. We recruited 125 study participants for this study whose details are further described in Table 1. Purposive sampling techniques were used so as to include a wide range of respondents. The inclusion criteria identified individuals who were residents or working within the informal settlements, Kenyan and refugees, both genders, and caring for a child below three years. Fourteen focus group discussions (FGDs) were conducted, ten with parents, two with community caregivers, and one each with healthcare workers and community health volunteers (CHVs). In consonance with standard recommended practice [25], FGDs comprised of six to ten participants and varied in composition, including homogenous categories such as male parents only, female parents, healthcare workers, and community caregivers. Furthermore, we sampled 13 key-informants, who represented a wide range of stakeholders including healthcare professionals, local administrators, and refugee leaders.

Study data collection procedures

The semi-structured interview and FGD guides were adapted from a study by Lingam et al. [26], and further refined by study authors to incorporate questions on potential ECD intervention focal areas - see Supplementary File 2. Local CHVs and refugee leaders identified and mobilized eligible participants, who were then contacted

by the research team for interview appointment scheduling. Hence, no prior relationship/interaction existed between the researchers and participants. On average, interviews lasted between 30 and 60 min and 60–90 min for FGDs. Interviews were conducted by research assistants (2 males and 3 females) trained on qualitative interviewing skills, in private and quiet venues, to enhance data quality and participants' privacy and confidentiality. Discussions were moderated in Swahili, the local language, or in English.

Data management and analysis

Audio-recorded interviews and discussions were transcribed verbatim in the original language (English or Swahili) by trained research assistants. The initial codebook was developed by CN and AA, after reading line by line a sample of transcripts to identify a priori and emergent themes. Transcripts were then imported into NVivo-Lumivero Windows© (QSR international), and analysed using a thematic approach [27]. VA and EN were involved in further categorization of themes and generating charts to explore patterns emerging in the dataset by respondent category. Thereafter, all authors were involved in the interpretation of the findings. We applied the Nurturing Care Framework for ECD [16], as an interpretative lens to aid in organizing themes and their presentation in the findings section structured around the following six overarching domains: parents' aspirations for their children; practices and beliefs in caregiving; newborn and infant feeding practices; early learning opportunities for young children, including play and communication; securing a safe and nurturing environment. Rigour, trustworthiness, and reflexivity were observed through maintaining a coding journal to document the evolving codebook and team reflections. Further, triangulation of data from FGDs and key informant interviews with multiple respondents was done. A dissemination meeting was organised for the health management and stakeholders in Dagoretti sub-county to share findings and aid with the interpretation.

Ethical consideration

This study was granted ethics approval by the Aga Khan University Institutional Review Board (004-ERC-SSHA-19-EA), and the Mount Sinai Hospital Research Ethics Board (18-0096-E). A research permit was granted by Kenya's National Commission for Science, Technology & Innovation (NACOSTI/P/19/50782/31710). All study participants provided written informed consent. Information covered during the informed consent process included objectives of the study, benefits and risks of study participation, voluntary nature of research participation, confidentiality, and data management. All participants had a chance to ask questions and seek clarifications prior to their involvement.

Results

The majority of key informants and FGD respondents were females (80%), with a mean age of 31 years, two-thirds ($n=81$, 64.8%) had a child below five years, and nearly 60% had attained basic education.

Parental aspirations for their children

Narratives from Kenyan and refugee respondents showed that parents had similar aspirations for the future and desired qualities for their children – additional illustrative quotation can be found in Supplementary File 3a. Kenyan parents' aspirations included good health for their children and for them to be fast learners and achievers of developmental milestones. They wished for their children's success in education, advancing to institutions of higher learning, and surpassing their parents' educational level. As one Kenyan mother shared, *'…when my child grows up I would like for them to be educated because today's society requires people who are learned, so my child does not end up living a troubled life [P4_FGD1_Mothers_Kenyan]'.* Most Kenyan parents aspired that their children's future professions would include medical doctors, lawyers, and teachers. There were few responses indicating preferences for blue-collar professions like plumbing or electrical works, perhaps because white-collar jobs are competitive and the challenges of high unemployment for trained professionals currently experienced in the Kenyan job market. Most Kenyan respondents aspired to see their children earn income through legitimate means, sufficient to support their parents and families.

> *Every parent wants to see their children succeed in the future, grow healthy, they get an education, they get a respectable job… a job that makes them earn enough… a job with security… unlike the informal sector jobs where you find they are selling biscuits [street vendors]; that it is not a job. [KII17_Leader_Kenyan]*

The qualities Kenyan parents wished their children would develop included being morally grounded, kind, respectful, patient, well-disciplined, independent, decisive, responsible, visionary, honest, and God-fearing. They also wished to see their children live to marry and have a peaceful family life. These views were equally expressed by Kenyan key informants interviewed.

Refugee respondents had similar aspirations for their children regarding education and career prospects. They wished for a better life for their children, different from the difficult and traumatic experiences they endured, as shared by a refugee mother, *'…I would not like to see my child live the life I experienced. First, we are in a foreign country, and you would not wish the negative things*

you experienced to recur to your child. My hope is that my child lives a good life, filled with happiness, and not to be stressed [P6_FGD6_Mothers_Refugee].' Some refugee respondents appreciated the education standards in Kenya, which they perceived to be comparatively better than what their countries of origin offered. Although some desired their children would secure employment in their home country due to the difficulties of immigrants getting jobs in Kenya. As observed by one refugee mother, *'…I teach my children to study well, get a job or the day we return to our country, they will get a job because I don't see if they will work here, it is difficult [P1_FGD7_Mothers_Refugee].'*

Refugee parents desired to mold a positive parent-child relationship to ensure they interacted well with their children at all life stages. Similar to Kenyan parents, refugee parents aspired to see their young children develop these qualities as they grew up; good discipline, respect, self-esteem, confidence, obedience, intelligence, God-fearing, and being positive role models to others in society.

Caregiving practices and beliefs

Interviews and group discussions explored prevailing practices, traditions, and ceremonies performed on children in their earliest days of life. These practices were perceived to protect children from harm and to provide cautionary advice in the care of young children. As one caregiver shared, *'in my community, when you give birth to a baby boy you are told to be watchful the umbilical cord stump does not fall on his private parts because if it does it will affect his manhood [P9_FGD8_Mothers_Refugee].'* Narratives from parents and stakeholders described the baby's journey post-delivery discharge, home arrival, care for the newborn and mother in the early days, as well as rituals and ceremonies performed during the early months post-birth including their timing and significance – see additional illustrative quotations in Supplementary File 3b.

Interview accounts showed that ceremonies/rituals performed for young children generally reflected the caregivers' place of origin/ethnicity and traditional or religious beliefs. Some caregivers strictly followed faith-based and religious doctrines such as baptism, prayer dedications, and newborn home visits. Traditional practices included: baby's first hair shaving; child naming ceremonies and how names were selected; massaging of the baby and head shaping; as well as protective rites like bathing the child with herbal mixtures and wearing of waist or wrist ornaments to dispel evil spirits. Contemporary practices such as 'baby-showers' to welcome the newborn were also mentioned. Whereas some participants preferred exclusively religious/traditional/contemporary practices, narratives showed preferences for a mix of practices too. Some practices differed in timing and procedure,, as shared by a Kenyan mother, *'…in our culture when you deliver, they wait after 3 months…they shave the [baby's] hair…[and] they do a celebration. If it is a baby boy, they will wait until 8 to 10 years and circumcise [P6_FGD3_Mothers_Kenyan].'*

Regarding child naming practices, respondents gave examples of how children were named. For example, children may be named after, and in honour of, deceased relatives (e.g. grandparents), or after ordinary people or prominent leaders in the community for their character attributes. Children may also be named to reflect the geographic season or historical era of birth. Similarly, some names are given to children for the positive meanings they convey within the culture. Illustrative examples of the meanings behind names are evident in the FGD responses below and in Supplementary File 3b:

> *P8: …When the child is born, the name they will give to the child is the name of grandparents who passed away …[there are] those who give a name according to the time [season] when the child was born… and there are those who give names that suggest importance or positive character. [FGD12_Caregivers_Kenyan]*
> *P4: … many [parents] do not want their children to be associated with names of bad people or who had bad customs and bad behaviour in society… I have seen many parents call their children names of people with character e.g. [President] Barack Obama, because of who he is and his outlook by the whole world. [FGD12_Caregivers_Kenyan]*

Factors such as physical distance from home of origin, financial situation, and the informal settlement environment restricted the observance of birth rituals or ceremonies, as expressed by one refugee parent, *'…those who come from Eastern part of DRC [Democratic Republic of Congo]…when the child is born…there is a day of welcoming the child into the family… Although we have been assimilated into Christianity, there are those who baptize the child as part of the ceremonies for the children before the age of two [FGD10_Fathers_Refugee].'* Respondents shared various reasons for practicing massaging and stretching of the baby: to relieve stress or fatigue the baby might be feeling after birth; a desire to 'mold' the baby's head and facial features; to help with stimulation and baby's development. The respondents below elaborated further on body massaging practices.

> *P10: …when a baby is born it is a must to shape their head…massaging of the head. Every time when the baby is sleeping on one side you must turn it on its other side…[as] the head might become shapeless. [FGD10_Fathers_Refugee]*

…in my community…they believe that once a baby is born, because of the positioning in the womb, the baby gets tired. You will find the older women or even the younger ones advising the mothers about massaging the baby after washing the baby. Others will even get some herbs, they pound them, and mix with some oil… [KII09_Caregiver_Kenyan].
P4: …others believe when the baby cries a lot after birth the baby has stomach problems, so they start giving them medicine…from the hospital or sometimes they massage the baby's stomach [FGD11_Healthcare-workers_Kenyan].

Other practices performed included cutting of the uvula at a young age. As shared by health workers interviewed, '*in some communities they cut the child's uvula to prevent them from getting coughs or throat infections when they are still young [P1_FGD11_Healthcare-workers_Kenyan].*

Newborn and infant feeding practices

Child feeding in the first six months

This theme featured parents' perspectives on child nutrition, particularly exploring views and practices around exclusive breastfeeding, giving mixed feeds within six months of a child's life, timing of complementary feeding, and dietary diversity – see additional illustrative quotations in Supplementary File 3c. There was consensus that breastfeeding should be initiated at birth and continued exclusively without introducing other foods throughout the first six months. Respondents also acknowledged the need to continue breastfeeding for longer (e.g. two years) to help the child grow stronger. Factors that deterred lactating mothers from exclusively breastfeeding were challenges with breastmilk storage and the use of breastmilk substitutes as shared by a Kenyan mother; '*…it is recommended that when resuming work, mothers should express breast milk and store the milk in a cold place for the baby to drink later when the mother is not around. …most mothers lack cold storage facilities…they opt to give the child packaged milk from shops or fresh cow milk [P5_FGD2_Mothers_Kenyan].* Other reasons for stopping breastfeeding included challenges with work in the informal economy, as exemplified by the following response.

…the major businesses around [this setting] are supermarkets…They [mothers] get in there before seven [AM] and leave at eight or nine PM… Will that mother get an opportunity to breastfeed? [KII07_Leader_Kenyan]

Barriers to exclusive breastfeeding that were cited included maternal illness, breast conditions (e.g. breast injuries or pain) and maternal perceptions of having low milk supply, or perceptions that breastmilk alone was insufficient for a hungry baby. Interview accounts showed there was inadequate involvement of other household members (e.g. house-helps) in supporting bottle-feeding of expressed milk. Most mothers commonly resorted to giving their children other liquids and food (e.g. light porridge) as one refugee mother shared, *'…my children when they get to three or four months they cry a lot at night meaning they are hungry and I have to prepare a light meal…there are those who start [semi-solid food] at two weeks when they cry showing signs of hunger [P2_FGD8_Mothers_Refugee].*

Respondents discussed reasons behind the early initiation of (semi)solid food before six months. In some communities, it was considered common practice for babies at three months to be given light porridge before transitioning to more solid food after six months. Others cited the need to assess a baby's readiness to accept and consume solid food, as shared by the following respondent.

P6: …After three months I started testing him [baby] with porridge, not thick porridge but soft. I prepared millet porridge with some little milk on it to take… I tested him [baby] with fruits. From six months I boiled bananas with spinach, if I cooked bananas and spinach, the [next day] I would prepare pumpkins and potatoes…and add oranges so he continues to grow. [FGD3_Mothers_Kenyan]

Some parents showed awareness of the dangers of mixed feeding to child health and overall development. For instance, a parent cited, *'…when you start giving a baby food before 6 months, they can get many illnesses such as throat infection because they are of poor health [P4_FGD2_Mothers_Kenyan].* Interviews explored caregiver knowledge and sources of information about child feeding and care. Female parents identified their mothers or older women, and educational radio programmes as the common sources of guidance on breastfeeding and early initiation after birth. A few respondents mentioned what they learnt during health talks in clinics, which included proper positioning and attachment, breast hygiene, how to express and warm breast milk, how to introduce complementary food, and seeking medical attention whenever babies refused to breastfeed. They also learnt about recommended diet for lactating mothers (e.g. consuming beans, raw peanuts, and bananas) that could help boost breast milk production.

P4: …I heard from the radio of 'lishe bora' [good nutrition]. When a baby is born and within the first hour you should breastfeed so the baby gets…that light milk like water. It [breastmilk] has everything. [FGD3_Mothers_Kenyan]

Interviews suggested that male caregivers had limited knowledge on maternal nutrition and breastfeeding, and in most cases, they relied on their female partners to share information gathered from clinic sessions. A refugee father shared, *'…they [women] attend clinics and they are more informed than men [caregivers], and when they come [home] they may not share what they were taught about breastfeeding [P9_FGD10_Fathers_Refugee].*

Introducing complementary food and dietary diversity

Most respondents reported that children should be introduced to semi-solid food at six months' of age – see additional illustrative quotations in Supplementary File 3c. Diet was predominantly starch-based like mashed potatoes, cooked bananas, pumpkin, or 'ugali' (maize meal) served with an accompaniment (e.g. vegetable soup) or commercial cereal products (e.g. Cerelac™ and Weetabix™). Servings also consisted of vegetables, dairy packaged milk, drinking water and seasonal fruits. While there was recognition of the importance of adding several ingredients in a baby's diet, the combination of porridge flour mixture was beyond the recommended nutrition guidance of maximum two cereals. One caregiver shared, *'I give him [baby] potatoes, a little spinach, and mix it with pumpkin and grind it all to make it a light meal… I also give him [baby] porridge made of flour with soya, ground nuts, rice and millet, which makes the child strong [P5_FGD7_Mothers_Refugee].* Some caregivers only served family meals due to their inability to purchase different baby food ingredients due to financial constraints as expressed by one parent, *'…I give the baby food that I am consuming at six months. If it is ugali (maize meal)… I also give the baby because of the cost of buying different things, which I cannot afford [P3_FGD7_Mothers_Refugee].*

Caregivers also acknowledged the need for gradual introduction of new food to the baby's diet and following nutrition advice provided. One caregiver shared, *'… in public health facilities…after six months of exclusive breastfeeding, they direct you to the nutrition [officer]. When you go to the nutrition [officer], they advise you to introduce complementary food. You could start with packaged milk only for maybe three days or five days…once the baby gets used to this, on the fourth day you could introduce porridge [P10_FGD1_Mothers_Kenyan].*

Respondents raised concerns about young children's nutrition and dietary diversity. For example, due to financial concerns, caregivers had difficulties preparing a healthy diet. Processed food was considered as quick-fix meals, easily accessible, and inexpensive but less nutritious than meals prepared in the home, as one respondent shared, *'…these people [caregivers] know what good food is. They know what is a balanced diet but prices for most of the commodities are beyond them…because a proper meal of let's say bananas, potatoes, milk, eggs in this context is hard for them… These things [processed food products] being purchased are new in the market and are bad for the children; carbohydrates, simple sugars, no protein for the children, no fruits and no vegetables [KII07_Leader_Kenyan].*

Other concerns raised were the quality and type of cooked food purchased from street food vendors and about beliefs surrounding certain food, which lead to restricted or moderated serving of otherwise healthy foods. For instance, egg consumption may be moderated because it perceived to be associated with delayed speech development in children.

The number of meals served to children also depended on caregivers' availability, as shared by one respondent, *'…for those [caregivers] who are not busy, they usually feed their children three meals… For those [caregivers] who are well off, they hire a maid [house help] who can do that, while other [[caregivers] feed their children twice [KII02_Leader_Refugee].*

Respondents perceived children's ability to feed independently or learn do so to be was associated with age (i.e. older age above one year). Caregivers were perceived to play a huge role in creating an enabling environment for children to self-feed. For instance, feeding with other children encouraged self-feeding, while over-reliance on adult feeding may cause delay.

> *P10: …Rich people with money treat their children like an egg [delicately]…and you may find their three-year old child still being fed. The way we [refugees] live we just put them [children] together, they share food with others, and they learn to eat [independently]. [FGD10_Fathers_Refugee]*

Stakeholders also considered forced-feeding practices, separating child from other family members at mealtimes, and serving flavourless/bland food as factors constraining children's acquisition of self-feeding skills. One healthcare worker shared, *'…['babies] eat before adults and the baby learns even to fear food because their plate is different, they are sat in a corner and unfortunately, they are forced to eat. Even they can feel they are forced to eat and finish. Baby food is boiled it has no flavour… [KII06_Healthcare-worker_Kenyan]'.*

Early learning opportunities for young children

Communication and language development

Parents and stakeholders were asked to describe how and when children begin to communicate – see additional illustrative quotations in Supplementary File 3d. Some respondents expressed that children communicate, begin to explore, and learn new things in their environment from birth. Some recognized that children responded to

caregivers' smiles during breastfeeding and emphasized the need for parents to keep talking with their children, even if they are too young to respond. Most respondents felt that children begin to comprehend words and caregiver's instructions when they are much older, and that the child's intellectual maturity is an important factor. For instance, some mentioned that at five and six months, children can wave goodbye and respond to their name when called. Uttering words and following instructions such as verbal warning to avoid certain behaviour was perceived to happen when children were above one year. Respondents had varied views regarding the age young children learn new things. For instance, refugee fathers mentioned this was more advanced during pre-school years, while Kenyan parents felt this happened during the child's first year of life. These views are elaborated further by the following respondents:

P?: I think it's from birth because when you make the baby laugh you see they smile, when you cuddle they stay calm, so it is from birth even if they do not respond, they understand.
P5: Babies begin to comprehend words from birth and as parents we need to communicate with the baby even if they do not talk. [FGD2_Mothers_Kenyan]
P5: …it depends, for children who are 'sharp' [intelligent] even at 9 months if you tell them 'bring me a plate!', they will bring it. [FGD6_Mothers__Refugee]
P4: When a baby is born they begin learning new things. When they open their eyes you see they start learning [FGD9_Fathers_Kenyan].

Parents and stakeholders interviewed reported more generally ways through which children communicated their needs and emotions. Cues or signs reported by respondents as indicating that a child was hungry or needed feeding included the following; a cry, a sunken stomach, a gesture such as pointing to a cup or plate, suckling fingers or play items, irritability, and, in the case of older children, verbally asking for food.

P?: The baby suckles fingers. When you see that you know they are hungry, or you will see they put playing items in their mouth or cry…[FGD4_Mothers_Kenyan].
P1: Some parents have their own schedule for feeding their babies like in the morning, at ten [AM)]. When that time reaches, they just know the baby is hungry because not all babies yawn or cry, some babies do not like feeding. [FGD11_Healthcare-workers_Kenyan]

Engaging children in play and stimulation activities

Interviews sought to establish parents' and stakeholders' perceptions of the age children learn to play. Most respondents linked age of play onset to the age of achieving developmental milestones, as well as children's levels of exposure – see additional illustrative quotes in Supplementary File 3d. Respondents comments on this subject included:

P5: When the child is 5 months, when you go to work and say bye, you see the child saying bye too [FGD9_Fathers_Kenyan].
P9: It depends on the level of exposure. A [child] could start [walking] at one and a half years but if the child is kept at home too much they will not learn how to play quickly. [FGD6_Mothers_Refugee]

Engaging in play, play materials, and accessibility

Respondents observed that children showed gendered preference in the choice of play items and games. For instance, boys liked to play with toy cars and balls, while girls liked dolls and mimicked them as babies – additional quotations are available in Supplementary File 3e.

P1: I see my children, especially the girl playing with dolls, then they come together and act like we [parents] do, they say, 'you are mum and you are dad'… The girl will take the dolls and will say 'I'm feeding my daughter, shower the baby and arrange the place.' [FGD10_Fathers_Refugee]

Caregivers exposed their children to baby cartoons on television through which they were able to learn songs and sounds. While TV watching and use of other electronic devices (e.g. mobile phones and tablets) were perceived as a convenient way to keep babies engaged, some respondents felt this affected play time and engagement in other physical play activities. Furthermore, some respondents recommended playing outdoors which helped promote children's physical development.

P? …they [children] don't play much because we put them to watch TV for long, even some [children] when they wake up it is cartoons they start to watch. However, for those [caregivers] who can afford, there [children] have bicycles and toys. [FGD2_Mothers_Kenyan]

Due to challenges regarding play space within informal settlements, taking children to recreational facilities was often considered as an alternative, although this largely depended on affordability. The choice of play items within households largely depended on caregivers' financial

capacity to purchase items from the shops. Some caregivers also identified objects found in households or outdoor environments as play items. Examples included water containers as drums, soil and clay as cooking ingredients, tins and plastic containers as cooking utensils, and hand-woven dolls for toy play – see additional illustrative quotations in Supplementary File 3e.

Narrating stories and reading books to young children

There were mixed views on the practice and frequency of reading books (with pictures) to young children – see additional illustrative quotations in Supplementary File 3e. Reading to children required availability of books within the home setting. While the majority did not have picture books at home, they used older siblings' school-books, mostly books with pictures of animals, food types, and images for colouring. Picture books were also bought from street vendors but depended on the caregiver's financial resources. In households with older siblings, homework time provided a learning opportunity for younger siblings

> *P10: There are these things that are sold on the road with animals painted on them. When my child sees them, he asks you what are these? [FGD06_Mothers_Refugee]*

Similarly, there were mixed views regarding the practice and regularity of narrating stories to children – see additional illustrative quotations in Supplementary File 3e. The most convenient time to engage children in storytelling varied and depended on caregivers' work schedules, engagement in other chores, as well as children's school schedule since they were mostly available during weekends and evenings. In instances where storytelling was practiced, this was incorporated into other daily activities such as after meals, caregiver's rest time, child's bedtime and when they woke up. Story telling time also provided an opportunity for enriching learning and interactive discussions between the child and caregiver as one father shared, *'…my two-and-a-half-year-old child loves nature and animals. When I narrate [stories] to him, he responds with answers [FGD9_Fathers_Kenyan].* For refugee parents, these moments were used to educate children about their family lineage and share experiences of fleeing from their home country.

> *P5: … As refugees, we have been through a lot, we have seen many things, you [refugee] have been fleeing since [19]93 and until now you are on the run. You must inform your child, "we fled like this, at this time and until today where we are" …because there are some [children] who don't even know how Burundi looks like…[FGD7_Mothers_Refugee].*

Some of the barriers to storytelling as a form of early learning opportunity were the lack of ample time for caregivers and a perception that young children are too young to comprehend stories.

Caregiver-child engagement in play and importance of play activities

Engaging children in interactive activities required appropriate balancing of work schedules, daily activities, and caregiving responsibilities. Opportunities to engage in play were incorporated during mealtimes, after completion of chores, when the caregiver was back from work, during child's feeding, bath and sleep routines, and during weekend family activities. Caregivers also joined their children in playing ball, singing, and playing hide and seek games, as shared by the following respondents.

> *P5: … when the child is done taking a bath, he usually enjoys staying and playing. So, I usually massage and he is happy. [FGD8_Mothers_Refugee]*
> *P3: …the child hides and waits when he shows up he tells you, 'mum again!' and goes back to hide. Now you have to keep up running with him. [FGD4_Mothers_Kenyan]*

Respondents cited barriers limiting caregiver engagement with children. For instance, busy and long working hours denied caregivers time to spend with their children. Some respondents mentioned the confined spaces in the informal settlements limited the variety of play activities.

> *…there are no spaces and the available ones are small, so the place to play is a problem. Parents are overwhelmed by the time they come home from work, they are so tired and preoccupied with thoughts of meal preparation and the following day's work…So they have no time to play with their children. [KII06_Healthcare-worker_Kenyan]*

Other reasons mentioned were linked to parenting knowledge gap, parents comparing their children with others without acknowledging that children develop at different paces, and, in few instances, caregiver disinterest in play activities – see additional illustrative quotations in Supplementary File 3e.

Respondents recognized the value of play and communication in children's development in various aspects. Through play, young children learnt to make friends, share with others through 'give and take' play, control their emotional temperament by mirroring appropriate behaviour from older children, as one parent observed, *'…through games, the child catches up with others even if he gets angry through playing with other [children],*

the child learns not to always be angry [P10_FGD1_Mothers_Kenyan]. Another parent commented on the importance of play interactions on language development, *'I come from Rwanda, I speak only Kinyarwanda. As my child interacts with other children from Kenya, he will learn Kiswahili and other native languages [P3_FGD10_Fathers_Refugee].*

Respondents shared children also learnt by observing and copying other's acts and demonstrated these during play – see additional illustrative quotations in Supplementary File 3e. Play moments were perceived to create opportunities to learn about adult responsibilities, develop career interests, and socialization processes. Besides the home environment, some respondents mentioned that places of worship, daycare centers, and pre-school offered opportunities for early learning, particularly in advancing a child's language and communication skills.

Securing a safe and nurturing environment

Praise and discipline approaches

Interviews with caregivers and stakeholders explored discipline and praise practices for young children in the informal settlements – see additional illustrative quotations in Supplementary File 3 f. Narratives showed no major differences by gender or among Kenyans and refugee respondents. Reasons for disciplining were triggered by child misbehaviour or actions that annoyed/frustrated the caregiver. Examples included, when a child cried with no reason, played with mud or water, excreted on themselves, refused to feed, messed the house, fought with other children, and broke or damaged household items. Child discipline through physical punishment was reported by most respondents. This included pinching, slapping, and caning of children as elaborated by the following respondents.

> *P7: …let's say you have a lot of clothes and you want to wash and that is when your child comes crying for you to carry and doesn't want to sit down. That is when you feel like slapping the child and wakes up when you are done with washing. [FGD1_Mothers_Kenyan]*
> *P2: [for a 3-year-old], when it comes to using the potty and the child didn't use it, it really annoys me, and I may end up beating him because he has to talk. [FGD3_Mothers_Kenyan]*
> *P3: If the child misbehaves, you sit with him and advise him, but if he does extremely wrong, you beat him with a whip on the legs, hands or buttocks… [FGD7_Mothers__Refugee].*

The use of non-physical disciplinary techniques such as verbal warning (including scolding and use of harsh language), denying privileges like watching television, and disciplinary corner timeouts were also mentioned. Some respondents emphasized the need for non-physical approaches in disciplining children, such as through moderating caregiver temperament when reacting to child misbehaviour to avoid upsetting the child as elaborated by the following respondents.

> *P?: You know there is a saying if you beat a child frequently, they get used to the beating and the pain… and won't see it as a big deal. So I just threaten my child, 'Should I beat you or should I call the doctor to give you an injection?'… [FGD5_Mothers_Kenyan].*
> *P1: …my wife does it better and there is a look she gives to the children, but for me I will deny them what they like most. If there is a TV program [my daughter] likes to watch on television and did something wrong, I will take the remote then she will come back and say I am sorry… [FGD10_Fathers__Refugee].*

Caregivers expressed their appreciation and praise for their children's acts and behaviour in various ways. Illustrative examples of gestures used to show affection towards the child included: clapping for the child following task accomplishment as a way of encouraging them to feed; buying gifts (clothes, foodstuff); taking children out for a treat - also used as reward for good behaviour or performance; hugging, tickling, singing for and complimenting the child.

> *P8: Mostly it is immediate appreciation for instance…if there was something she was bringing for you, you appreciate on the spot or you promise her something like bringing them candy, biscuit, or avocado. If the child loves church and every Sunday she is always happy when going to church, you will tell her, 'next Sunday we will go to church or visit a friend or family relative.' [FGD10_Fathers_Refugee]*

Caregiver needs and challenges

Interviews and group discussions explored parenting experiences, in particular challenges caregivers faced, sources of support, and areas of needs that could potentially inform the content and design of a caregivers' intervention – see additional illustrative quotations in Supplementary File 3 g. A common challenge affecting both Kenyan and refugee caregivers was the economic hardship and unsecure livelihoods, which undermined their ability to meet basic needs such as child nutrition, educational expenses, and household utility costs, as expressed by the following respondents.

P5: …the problem we have… is paying the teacher's tuition, if the parent has not paid, your child does not study and is sent back home… [FGD6_Mothers__Refugee].
P?: …When I have employment I have no worries because I know I could go hustle and get money to buy things for my child. During the times I have no employment I usually have challenges [FGD5_Mothers__Kenyan].
P2: For the refugee mothers they are unemployed, even when children ask for items like a sweet, she waits for the father to come back [home] to give them ten shillings to buy the item. [FGD10_Fathers__Refugee]

For mothers, the lack of autonomy (i.e. financial dependency and influence of significant others such as spouses and in-laws), their physical health, single parenting, and exposure to violence/maltreatment such as domestic and gender-based violence, were vulnerabilities that affected caregiving responsibilities. The latter were particularly raised by stakeholders in local leadership roles who received community reports and dealt with issues of gender-based violence.

P: Most of the mothers are unemployed yet they have families to take care of. Domestic violence is another challenge, most of them [mothers] are resilient. Healthcare is a big problem to the mothers because they are the first-line caregivers of the children… [KII07_Leader_Kenyan].

Respondents shared worries and concerns parents in the informal settlements had of their children's present and future lives. They worried about drug and alcohol abuse, teenage pregnancy, unemployment, and exposure to various forms of abuse as observed by one healthcare worker, *'…the lack of food and water because water is sold here at five [Kenya] shillings per 20 Liter. Some [parents] do not even wash clothes for their children because of lack of water. Security of the children is also not good because this area is unsafe… [KII06_Healthcare-worker_Kenyan]'.*

Refugee caregivers experienced additional and unique challenges due to their migrant status. First, they faced hardship assimilating to a new environment and culture. Second, the lack of official documentation for residence, e.g. passports or papers authorizing their stay in Kenya, was a barrier to many other processes. These included access to healthcare, applications for business licenses, registration for birth certificates and marriages, access to financial services and credit facilities such as mobile money platforms and bank loans. Refugee parents also reported discrimination due to their nationality and language barrier.

P: …Many refugees have not received an identification and without this you cannot even get a [mobile phone] line, you cannot open an account, this is a very big challenge… A Kenyan has identification and can apply for a job anywhere. These [refugee] women are educated and have diplomas, but they cannot go seeking for employment without an identification, registered pin [certificate], or even get a marriage license. [KII03_Leader_Refugee]

Based on the predicaments experienced by refugee families, we sought to explore existing structures or places they could turn to for support. Respondents identified support from organizations that offered public healthcare services and access to the National Hospital Insurance Fund (NHIF) - Kenya's social health insurance provider. Respondents reported non-institutionalized refugees had limited organizational support to help meet their needs compared to refugees in camps. Other sources that were used to identify where caregivers (both Kenyan and refugee families) could receive support to deal with some of the above mentioned challenges included: relatives and friends for social support; places of worship for counselling support; organizations and local authorities for legal aid and security; self-help groups, micro-credit institutions and government cash transfer programmes for securing business capital; and, individual well-wishers and politicians for financial and material support – see illustrative quotations in Supplementary File 3 g.

Discussion

Findings from our qualitative study in Nairobi's informal settlements highlight several issues related to caregiving practices within this setting, and particularly unique for a mixed population composed of Kenyans of different ethnic backgrounds and immigrants - refugees from neighbouring countries. Through this formative inquiry, we identified existing knowledge and prevailing practices on care for young children below three years, as well as barriers and facilitators to caregiving in the informal settlements, which could inform the development of a contextually relevant and culturally appropriate set of interventions to meet the needs of this population.

Kenyan and refugee caregivers had positive aspirations for their children, recognized the need for laying a good foundation, and desired a better future for their children. However, their caregiving experiences and capacity were compounded by prevailing socio-economic challenges characterized by high unemployment and the lack of economic opportunities. Studies have established the important mediatory role of parental aspirations and future child educational outcomes and upward progression. A longitudinal study examining academic achievement among children in Kenya's urban settlements found that

parental aspiration and close monitoring significantly influenced performance in national primary education examinations of children from informal settlements compared to their counterparts in formal settlements [28].

In Kenya, unemployment remains an eminent concern and the informal economy plays a crucial role in creating job opportunities to bridge this gap [29]. Most of the informal casual jobs, however, are characterized by low, irregular pay, and poor labour practices. For example, unsafe working conditions, little or no rest and importantly, earnings are tied to provision of labour. Absence due to illness or other indispositions imply loss of livelihood. Our findings reveal refugees in these settlements face multiple barriers. For instance, while Kenya's Refugee Acts 2006 and 2021 (enacted to law in 2023) provides equal rights to employment, obtaining work permits, business licensure, and absorption in the job market as skilled or casual workers are impediments to effective parenting [30]. This implies when conceptualizing an ECD intervention with a refugee-focus, it is important to consider how these economic barriers and inequities can be alleviated. Future programmes of support might usefully include a component on economic empowerment that could offer skills-training, financial literacy/management, and opportunities to access business capital. Furthermore, there is a need to establish and strengthen linkages with refugee service organizations to facilitate access to additional support including legal, health, and social services, with the potential to facilitate refugee integration with their host communities. Social-safety net programmes are much needed, especially in an era when the COVID-19 pandemic left catastrophic effects on the economies and livelihoods of informal settlement residents [31].

Adequate nutrition and good health are important for child development and survival, as emphasized in the Nurturing Care Framework [16], and have a direct or indirect bearing to the United Nations SDGs such as Goal 2 'Zero Hunger', Goal 3 'Good Health and Wellbeing' among others [32]. Our findings suggest certain practices and actions may influence the realization of these goals. Optimal breastfeeding done exclusively for the first six months' post-birth was a challenge for mothers returning to work who had to leave their young children under the care of other family caregivers or in community daycare centers. An identified need for this subpopulation was access to knowledge to promote proper child feeding and nutrition: for instance, how to express, store breastmilk with/out a refrigerator and preparation for later use; maternal knowledge on the importance of exclusively breastfeeding without premature initiation of semi-solid food; and encouraging dietary diversity during complementary feeding. The latter is of particular concern since findings from our quantitative formative study based on the UNICEF Multiple Indicator Cluster Survey items showed only one in five households ($n=576$) in these informal settlements met the minimum requirement of serving children food from four out of the seven food groups [21]. Additionally, there were observed differences between Kenyan and immigrant households on minimum dietary diversity [10]. Evidence from a pooled analysis from 32 African countries established the prevalence of adequate minimum dietary diversity for children below 24 months was 25% (range 5 – 43.6%) [33]. In Kenya, evidence from available datasets estimates 44% of young children had minimum acceptable diet in 2018 [34]. This evidence raises concerns about child nutritional status and its long-term impact. Future interventions could consider including a nutrition education component, especially focusing on food group composition, affordability, and local availability. Dealing with maternal perceptions of having inadequate breastmilk, beliefs and practices that cause premature introduction of (semi)solid food to young babies requires a tactful approach that respects cultural influences and strives to impart appropriate knowledge and share best practices. Above all, there is a need for multi-sectoral coordination that ensures a collective approach is forged to address challenges of nutrition and food security in these settings.

Early stimulation and opportunities for early learning in the first 1000 days of a child's life are instrumental in brain development, language, and socio-emotional development [35]. In our study, we found within home settings caregivers struggled to create optimal time to engage their children in interactive activities, which required balancing work schedules and household responsibilities. Perceptions and gendered stereotypes such as the notion that fathers and older siblings should be the ones engaging in play activities, and infants are too young to play or communicate may have influences on promoting play practices. In these settlements, while the use of electronic devices was perceived as a convenient way to keep children engaged, physical play, and storytelling practices were less commonly practiced. Our quantitative formative study showed, while children had play items, with the majority having shop-bought items, only 1% of households possessed three or more books for children [10]. Furthermore, this study showed 50% of mothers compared to 14% of fathers engaged their children in activities to support learning and school readiness [10, 21]. In comparison with existing evidence, a study in rural Kenya reported maternal engagement in early stimulation activities for young children was 60%, although the study reported there was less engagement of stimulation activities for children below six months [36]. Other factors that may limit optimal engagement include less child-directed play, cultural and gender stereotypes, where caregiving

is perceived as the primary role of women, and the lack of awareness of using available and low resource play items in the home environment [26, 37]. Within our context, we first recognize the important role of extended family members, siblings, and hired helpers in the caregiving process. Therefore, we advocate for interventions that strive to tap into this social support system and those that focus on strengthening interactive child-caregiver engagement. The Care for Child Development (CCD) programme is a model intervention that embodies responsive caregiving and offers practical guidance on age-appropriate play and communication activities [38]. Although the CCD and its prototype programmes have been adapted and scaled up by various governments including Kenya, there is need for formal research on lessons of the CCD programme implementation and impact on child outcomes in similar settings [39, 40].

Our findings suggest that the use of harsh child disciplinary methods (both physical and psychological) is a prevalent issue and an area that may benefit intervening. First, numerous study participants were still able to identify and acknowledge the value of positive reinforcement and use of limit setting approaches, which are non-violent. ECD programmes offer an entry point of strengthening, championing and promoting such positive practices within the community. Besides, given the prevailing understanding of the triggers of harsh discipline as well as some positive practices by caregivers, ECD programmers need to ensure that they co-design modules/intervention components together with caregivers, children and stakeholders on child discipline, self-care, and stress management. Studies have demonstrated that co-design of ECD interventions with caregivers together with their extended social support system, and stakeholders improves integration of local practices and knowledge, helps in mitigation of perceived limitations, and can help family members to develop stronger social bonds [41, 42]. Lastly, the findings emphasize the need to equip/train ECD programmers on child protection and safety in order to mainstream this component in ECD programme implementation.

Recommendations and future research directions

Our study provides insights on the practices and intricacies surrounding caring for young children in an urban informal settlement context with a heterogenous population of Kenyans from diverse ethnic backgrounds and protracted refugees. There were commonalities in caregiving practices among Kenyans and refugees, but the notable differences in practices point to the need for understanding the cultural organization of children's environment, and the importance of scaffolding caregivers' customs of care [43]. The structural barriers in the child's ecology such as caregivers' financial challenges, restrictive work arrangements, and confined environments limiting stimulation practices suggest the need for supportive policies and tailored initiatives to promote ECD among work environments. Proposals on this front could include incentivising and enforcing maternity/paternity leave arrangements, offering facilities for nursing/storage, and other initiatives that promote good parenting. A great threat to many urban settlements is the shrinking of outdoor space and safe play spaces for children due to poor urban planning. This calls for collective advocacy by communities, ECD stakeholders and state departments to champion for and reserve green spaces, especially in the informal settlements. The plight of refugees and the unique challenges they experience raises the importance of ensuring their needs, inclusion and representation are prioritized in any form of intervention, and lessons from this approach have been outlined in one of our earlier works [12]. The contribution of formative research to ECD intervention development serves as an important precursor to generate in-depth understanding of the target recipients' needs, identify relevant programme content, and appropriate delivery platforms. Although it was beyond the scope of this paper to describe the integrated ECD intervention that was eventually developed [12], key insights that emerged through this exploratory piece were the importance of enhancing male involvement, efforts to promote early stimulation and learning for younger children, and strengthening caregiver self-efficacy in responsive parenting practices. Further, it is worth noting there have been growing numbers of multicomponent ECD interventions that have been recently trialled within this region and are partly informed by formative research [44–47].

Strengths and limitations

This qualitative formative study provides a rich description of caregiving practices that unveils a broad range of issues affecting the care and development of young children in urban informal settlements of Nairobi, Kenya. A particular strength of this study is the diverse representation of caregivers and stakeholders (local leadership, government officials, health workers, and community-based workers/volunteers), natives and migrants, and the use of multiple data collection approaches, including focus group discussions and in-depth interviews allowed for triangulation, and in-depth interrogation of the subject matter. The mixed methods approach involving a situational analysis, qualitative study and household survey applied in the larger formative study has allowed the corroboration of findings and a comprehensive outlook of the phenomenon studied. The use of the Nurturing Care Framework was valuable in the analysis and mapping out the potential needs for this highly vulnerable population. A potential limitation would be the need for careful

interpretation of these results in a changing ecological context, characterized by factors such as changes in political and health transitions like the COVID-19 pandemic.

Conclusion

Our study highlights the interplay of various factors affecting optimal caregiving for young children in an informal settlement with Kenyans and refugees. These include caregiver-related factors, cultural influences, the neighbourhood setting, and economic factors. Integrated early child development interventions are needed, and especially those that strive to anchor along caregiver's social support system, co-designed together with community stakeholders, that ideally focus on parent skills training promoting nurturing care, economic empowerment and safety-net programmes for such a mixed population.

Abbreviations

CCD	care for child development
CHV	community health volunteer
ECD	early childhood development
FGD	focus group discussion
KII	key informant interview
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organisation

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-024-20018-6.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Acknowledgements

We thank all study participants for their contribution to this research. We acknowledge the support from Dagoretti sub-county Ministry of Health team and the Daraja Civic Initiative Forum during the formative phase of this study.

Author contributions

KM, SL, AA and MCM contributed to the conception, design of the study and funding acquisition. KM, SL, AA, MCM, GM, TM, MK, JM, and LZ, contributed to the methodology. Data collection and curation was supported by MK, EN, EO, MMM, EKO, and AA. VA, EN, CN, and AA were involved in various phases of data analysis. VA wrote the first draft and received contributions from AA, SM, MK, DS, EN, EKO, MMM, KP, SL, and MCM in subsequent drafts of the manuscript. All authors contributed to the manuscript revision, read, and approved the submitted version.

Funding

This work was supported by funding from the International Development Research Centre (IDRC) and the Aga Khan Foundation Canada (AKFC) through the project on Improving Early Childhood Development and Well-Being in Refugee and Other Marginalized Communities (Centre File: 108506–002). The funders did not play any role in the design of the study and collection, analysis, and interpretation of data and in writing this manuscript.

Data availability

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Data availability

All data for this study are included in the manuscript and contained in the article's supplementary files.

Declarations

Ethics approval and consent to participate

The study was conducted according to the guidelines of the Declaration of Helsinki and Scientific and ethical approval was obtained from the Aga Khan University's Institutional Review Board (004-ERC-SSHA-19-EA), and the Mount Sinai Hospital Research Ethics Board (18-0096-E). A research permit was granted by Kenya's National Commission for Science, Technology & Innovation (NACOSTI/P/19/50782/31710). Additional permissions were obtained from the Nairobi County Government Directorate of Health Services and the Dagoretti Sub-county Ministry of Health. All study participants were provided with detailed description of the study, benefits, risks and what the study involved. Informed consent was obtained from all the participants and their legal guardians.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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.

Author details

[1]Institute for Human Development, Aga Khan University, Nairobi, Kenya
[2]Neuroassement group, KEMRI/Wellcome Trust Research Programme, Centre for Geographic Medicine Research, Kilifi, Kenya
[3]Alliance for Human Development, Lunenfeld-Tanenbaum Research Institute, Toronto, Canada
[4]Key Laboratory of Learning and Cognition, School of Psychology, Capital Normal University, Beijing, China
[5]Department of Psychology, Western University London, London, ON, Canada
[6]Centre for Child Development, Mental Health and Policy, Department of Psychology, University of Toronto, Mississauga, Canada
[7]Humboldt Centre for Child Development and Faculty of Education, Leipzig University, Leipzig, Germany

Received: 30 July 2023 / Accepted: 9 September 2024
Published online: 27 September 2024

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