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Exploring early childhood development programming in Kenya's arid and semi-arid lands

Authors:
Phyllis Magoma[1]
Amina Abubakar[1,2,3]
Martha Kaniala[1]
Barack Aoko[1]
Moses Esala[1]
Joyce Marangu[1]
Susan Nyamanya[1]
Margaret Kabue[1]
Siad Guyo[4]
Abubakar Baasba[5]
John Ng'asike[6]
Anil Khamis[1]
Esther Jebor Chongwo[1,7]

Affiliations:
[1]Institute for Human Development, Aga Khan University, Nairobi, Kenya

[2]Centre for Geographic Medicine Research, Kenya Medical Research Institute/ Wellcome Trust Research Programme, Kilifi, Kenya

[3]Department of Psychiatry, University of Oxford, Oxford, United Kingdom

[4]Isiolo County Government, Isiolo, Kenya

[5]Department of Health, Lamu County Government, Lamu, Kenya

[6]Department of Early Childhood Studies, Turkana University College, Lodwar, Kenya

[7]Department of Clinical, Neuro- and Developmental Psychology, Faculty of Behavioural and Movement Sciences, Vrije Universiteit Amsterdam, Amsterdam, the Netherlands

Corresponding author:
Esther Jebor Chongwo,
esther.chongwo@aku.edu

Background: Promoting high-quality early childhood development (ECD) is vital for individuals' physical and social well-being and yields significant societal returns. However, children in marginalised regions like Kenya's arid and semi-arid lands (ASALs) face significant barriers to accessing quality ECD services.

Aim: This study aimed to document existing ECD services in Kenya's ASAL areas, including their availability, types and key characteristics; identify gaps in their provision and propose solutions to enhance access and quality.

Setting: This qualitative study was conducted in 10 ASAL counties in Kenya.

Methods: Using purposive and snowball sampling techniques, 103 key informants, including pre-primary teachers, parents, healthcare workers, religious leaders and county ECD coordinators, were interviewed. The interviews were audio-recorded, transcribed verbatim and analysed thematically.

Results: The study found that while diverse ECD programmes exist in ASAL regions, their quality and effectiveness are hindered by challenges such as inadequate funding, insecurity, extreme weather events, food insecurity, poor infrastructure, inadequate healthcare access and limited early learning opportunities. Recommendations include increasing ECD funding, improving healthcare, enhancing early learning opportunities, promoting livelihood diversification and addressing security and food insecurity.

Conclusion: Despite investments in ECD programmes, significant challenges persist, underscoring the need to provide children with high-quality services that foster nurturing care and mitigate risks to their development. This study highlights the urgency of adopting a multi-sectoral approach to strengthen ECD programmes and services in Kenya's ASAL.

Contribution: This article contributes to the scarce literature on ECD programming in Kenya's ASALs by documenting existing ECD services, identifying critical gaps in their provision and offering actionable recommendations to address barriers to programme quality and effectiveness.

Keywords: early childhood development (ECD); ECD programming; arid and semi-arid lands (ASAL); nurturing care; high-quality programmes; multisectoral approach; Kenya.

Introduction

Early childhood development (ECD) is a critical developmental stage spanning from conception to 8 years, laying the foundation for future development across various domains such as education, health, and social and emotional well-being (WHO 2020; Yoshikawa et al. 2018). The experiences encountered during this period substantially influence a child's cognitive, physical, language and social-emotional development, underscoring the profound significance of the first 5 years (Neuman & Powers 2021). Promoting high-quality ECD is essential for fostering holistic development and enhancing outcomes such as increased labour earnings, reduced engagement in criminal activities and improved social cohesion (Chan 2013; García et al. 2017; Shonkoff et al. 2012). As a critical window for shaping lifelong trajectories, ECD not only mitigates risks but also amplifies the positive impacts of early interventions (UNICEF 2016). High-quality early childhood programmes and interventions are essential in ensuring that

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Note: Additional supporting information may be found in the online version of this article as Online Appendix 1; Online Appendix 2; and Online Appendix 3.

every child achieves his or her full developmental potential (Naudeau et al. 2011b). High-quality programmes and services refer to those providing comprehensive services – a safe nurturing and stimulating environment, proper healthcare, nutrition, early learning opportunities, safety and security and responsive caregiving tailored to the needs of children aged 0–8 years (Britto, Yoshikawa & Boller 2011), particularly those in resource-limited settings. This not only fulfils their fundamental human right but also serves as a prerequisite for the realisation of the Sustainable Development Goals (SDGs) (Woodhead 2016).

Global commitments and multilateral support towards ECD are on the rise, as evidenced by recent developments (Black et al. 2017; Chan 2013). This surge in attention has been bolstered by three influential LANCET Series on ECD (Black et al. 2017; Britto et al. 2017; Richter et al. 2017), the integration of ECD into the SDGs in 2015 and the adoption of the Nurturing Care Framework (NCF) (WHO 2018). These concerted global efforts aim to ensure equitable access to quality ECD for all children by the year 2030. Investing in ECD not only benefits children directly, but it also serves as a bedrock for achieving multiple SDGs related to education (SDG 4.2), health (SDG 3.2), nutrition (SDG 2.2) and protection (SDG 16.2). The NCF provides a roadmap for implementing diverse ECD programmes and service provision (WHO 2018). It emphasises the importance of anchoring effective and high-quality ECD programmes and services on the five inseparable components of nurturing care: good health, optimal nutrition, safety and security, opportunities for early learning and responsive caregiving (Britto et al. 2018; Richter et al. 2017).

Despite these global efforts, a considerable number of children, particularly from low- and middle-income countries (LMICs), are regrettably deprived of the invaluable benefits that high-quality ECD programmes offer (Naudeau et al. 2011a). Research indicates that in LMICs an estimated 43% of children less than 5 years of age are at a high risk of not attaining their full developmental potential. Over 66% of these children live in sub-Saharan Africa (Black et al. 2017). For children growing up among geographically marginalised communities in the arid and semi-arid land (ASAL) regions, the risk is exacerbated.

The ASALs make up approximately 84% of Kenya's total land area, and they are inhabited by 20% of the country's total population. These areas are characterised by challenging climatic conditions, marked by low and irregular rainfall and limited water resources (Ameso et al. 2018; Amwata, Nyariki & Musimba 2016). Poverty and limited economic opportunities are stark realities in the ASAL regions; as a result, communities living there predominantly rely on pastoralism as a way of life (Amwata et al. 2016). The 2022 Kenya Poverty Report highlighted that close to two-thirds of residents in Frontier Counties Development Council (FCDC) counties, which are primarily ASAL, live below the poverty line, leading to a child multidimensional poverty rate of 47.7%, higher than the national rate. Their prevalent nomadic or semi-nomadic lifestyle significantly influences their social structures, day-to-day activities and access to various ECD services and programmes (Bauer & Mburu 2017; Nyariki & Amwata 2019).

According to the 2022 Kenya Demographic Health Survey (KDHS) report (KDHS 2022), the ASAL counties, especially those from the FCDC bloc, have significantly lower literacy rates and limited access to education, healthcare and adequate infrastructure compared to the national average (KNBS 2019). Vaccination rates for children under 2 years old stand at 55.89%, which is significantly lower than the national rate of 80%, with only a quarter of children being fully vaccinated. Notably, the FCDC counties are leading in the prevalence rate of stunting (20%), wasting (14.68%) and underweight (21%). This is above the national rate, which stands at 17.5%, 5% and 10% underweight, respectively. These counties also predominantly fall within the lowest wealth quantiles (KDHS 2022). However, there are limited empirical findings on factors impeding effective provision of ECD services and programmes in these areas. Identifying these gaps and challenges is important for the development of context-specific interventions tailored to address the specific needs of children in the ASAL communities. By doing so, we can promote equitable access to high-quality ECD programmes, ensuring optimal opportunities for children's holistic development.

Key research questions

1. *Which ECD services and programmes exist in the ASAL areas?*
2. *What are the gaps in the implementation of ECD services and programmes for children living in the ASAL communities? What are the challenges and barriers to effective implementation of ECD programmes?*
3. *What recommendations could feed into policy to guide future investments and programming in ECD in the ASAL areas?*

Research methods and design

Study design

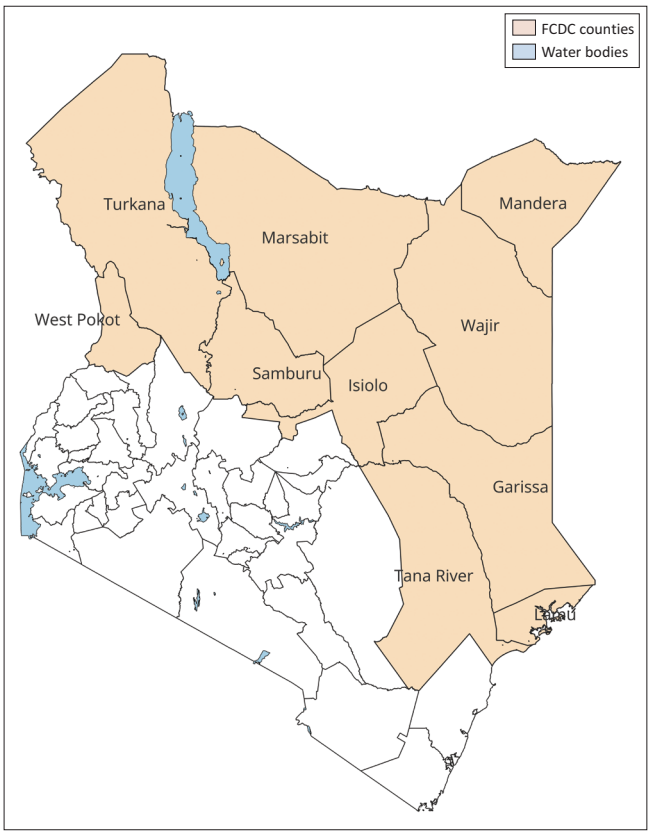
This was a qualitative study where data were obtained through in-depth telephonic interviews with key informants (KIIs) using a semi-structured interview guide developed by the research team. It was part of a broader formative research project on ECD in the ASAL regions.

Study setting

This study was conducted in 10 ASAL counties in Kenya: Turkana, Garissa, Wajir, Isiolo, Marsabit, Samburu, Tana River, Lamu, West Pokot and Mandera counties. These counties form the FCDC, a regional economic bloc. They were selected because of their high poverty levels, low development indicators (KDHS 2022), extreme weather events and resource- or ethnic-driven conflicts among communities. Their common cultural elements include a nomadic lifestyle, religious diversity and the ability to adapt to harsh environments. Figure 1 displays the distribution of the counties.

Study participants and sampling criteria

Study participants were selected using purposive and snowball sampling techniques. County directors of education and health linked us with facilitators who mobilised the key informants for the study. A total of 103 respondents (58 males and 45 females) involved in the ECD sector were selected (Table 1 for their demographic characteristics). They included pre-primary teachers, healthcare workers, social service workers, religious leaders, county ECD coordinators, members of the civil society, local administration security agents, caregivers and parents. This ensured varied perspectives in the study.



Note: The map was created using QGIS Version 3.8 'Zanzibar' (Open Source Geospatial Foundation, Chicago, IL, United States), an open-source geographic information system, and the shapefile obtained from The Humanitarian Data Exchange (HDX), an open-access platform (https://data.humdata.org/dataset/cod-ab-ken).

FCDC, frontier counties development council.

FIGURE 1: Counties' distribution.

TABLE 1: Demographic details of the qualitative sample (N = 103).

Characteristics key informant interviews	Total	
	n	%
Gender		
Males	58	56.3
Females	45	43.7
Mean age range (years)	43.89 (29–71)	-
Highest levels of education		
Primary and below	14	13.6
Secondary level	11	10.7
Tertiary level	75	72.8
Madrassa	3	2.9
Religion		
Christians	41	39.8
Muslims	62	60.2

Data collection process and management

Qualitative data were collected telephonically by two trained research assistants (B.A. and M. Kaniala) using a semi-structured interview guide developed by all authors (Online Appendix 1). The interviews were conducted between June and August 2022 in English and Kiswahili, following verbal consent from participants. The content guide included questions about existing ECD services, resources, programmes, contextual ECD needs, challenges and resilience in childcare within ASAL areas. A pilot test with four participants was conducted to refine questions for clarity before data collection.

To schedule interviews, participants who had consented to participate in the study were called to arrange a suitable time and advised to find a quiet space. On the interview day, sessions started with introductions, a study overview and informed consent procedures. As proof that the study participants had verbally consented to take part in the survey, our research assistants signed a copy of the informed consent form. Permission for audio recording the interviews was obtained, and clarifications were provided as needed. Topic guides were adjusted iteratively during data collection to incorporate emerging insights. Individual interview summaries were prepared immediately after each session. A total of 103 key informants were interviewed, with each interview lasting 30 min to 1 h.

Transect walk

To enhance data depth, a transect walk was conducted in Lamu, Turkana and Isiolo counties to assess the quality of physical facilities offering health and early learning opportunities in the ASAL areas. We visited five early childhood development education (ECDE) and pre-primary learning centres in Turkana and Isiolo, one of which was for hearing-impaired children. We visited three county referral hospitals (Lamu, Turkana and Isiolo), six dispensaries and one health centre. Structured observations using a checklist documented facility quality. Discussions with ECDE teachers and healthcare providers in the maternal and child health (MCH) clinics supplemented the data. Permission was obtained from the relevant authorities before accessing the facilities.

Data analysis

Interviews were audio recorded and transcribed verbatim in English or Kiswahili, with each file assigned a unique identifier. Transcripts were anonymised using serial numbers and reviewed by the research team (B.A., Martha Kaniala, M.E., E.C. and P.M.) before being imported into NVIVO 12 software for analysis. Coding was conducted by Martha Kaniala, B.A. and M.E. using thematic analysis aligned with key objectives. The NCF was applied as an interpretive lens to organise and present themes on the factors to guide data collection, thematic mapping and organisation of emerging themes during analysis. Further, this study's reporting was guided by the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist (Tong, Sainsbury & Craig 2007).

Ethical considerations

Research approval and authorisation were first obtained from the Aga Khan University Institutional Ethics Review Committee (2022/ISERC_04[v3]) and the National Commission for Science Technology and Innovation (NACOSTI/P/23/17335). Furthermore, permission was also sought from the counties involved in the study.

Results

This segment presents findings from qualitative interviews, which are cross-referenced with observations from the transect walk conducted in ECD centres and health facilities within the ASAL region. The section is organised as follows: It begins with an overview of available ECD services and programmes, proceeds to identify gaps in the provision of these services, discusses the challenges encountered and concludes by highlighting recommendations provided by various stakeholders.

Available early childhood development services and programmes

Key informants highlighted various ECD programmes and services available in the ASAL areas, implemented by the national and county governments, non-governmental organisations (NGOs) and the local communities. These programmes cater to children's needs in nutrition, healthcare, early learning, safety and security, playing a crucial role in promoting their holistic development despite the unique challenges they face. While these programmes positively impact children's lives, there is a need for further expansion and quality improvement, addressing cultural sensitivities essential to ensuring all children in ASAL areas reach their full potential.

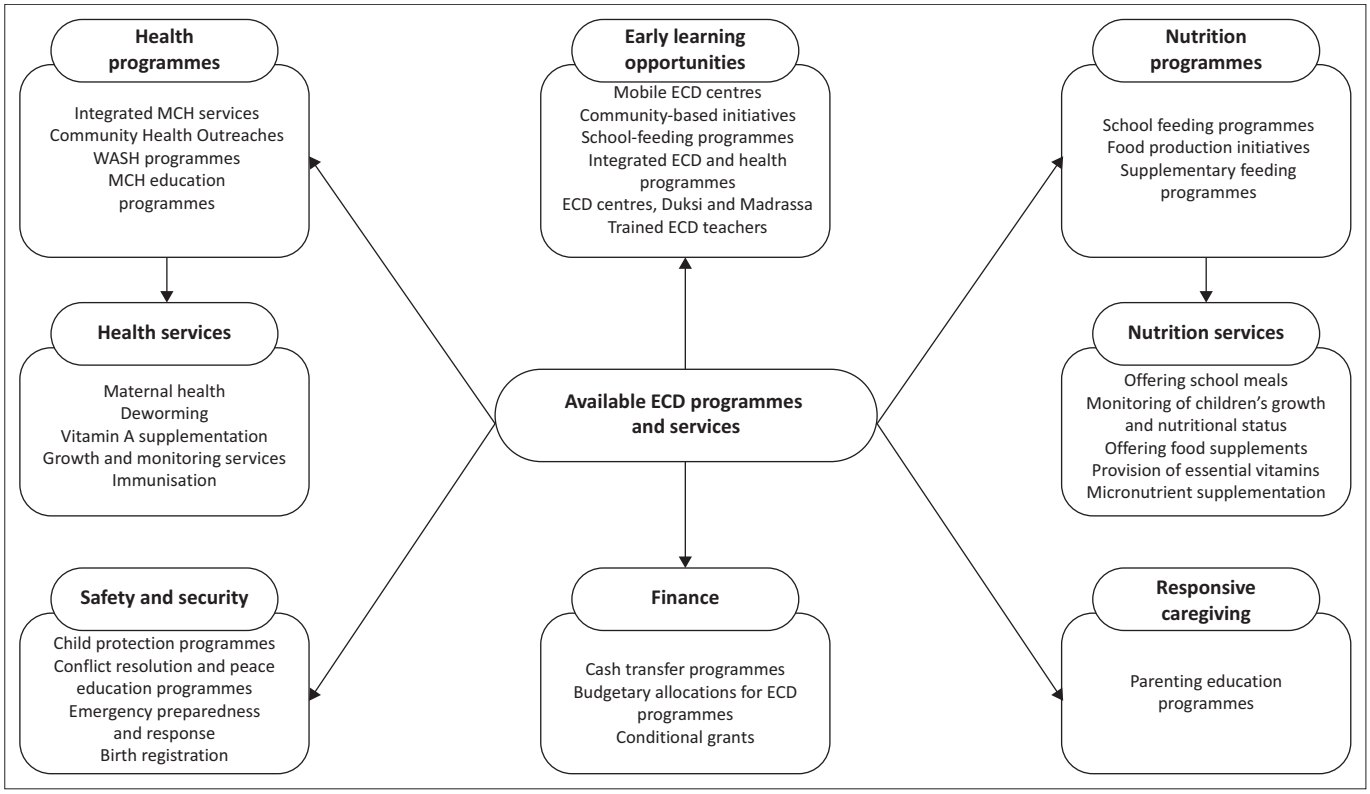
Figure 2 provides an overview of these services and programmes. The diagram outlines the various ECD programmes and services available, highlighting key areas such as health, nutrition, early learning, safety and security, responsive caregiving and financial support.

Gaps in the provision of early childhood development services

This section presents participants' perspectives on the barriers of ineffective implementation of ECD programmes and services in the ASAL counties. Findings from the interviews were triangulated with observations made during the transect walk. These results are presented according to the components of the NCF: good health, early learning opportunities, nutrition, responsive caregiving and safety and security (see Online Appendix 2 for additional quotes).

Good health

Inadequate physical healthcare infrastructure: Respondents expressed concerns about the lack of proper and adequate infrastructure to effectively provide healthcare services. They mentioned that there are very few health facilities in the area, which are also poorly equipped, and they are located far away, which makes it difficult for them to access timely healthcare services:



MCH, maternal and child health; ECD, early childhood development; WASH, water, sanitation and hygiene.

FIGURE 2: Early childhood development services and programmes available in the arid and semi-arid land counties.

'… [*I*]n my area, we don't have any dispensary, nor do we have doctors. The nearest dispensary is about 17 kilometers from here. Sometimes you may reach there and find there are no drugs. We are having talks with the county govt to build at least one dispensary nearby. This location has many households.' (Male, Caregiver, 46 years)

'[*Y*]ou get a health facility that doesn't have electricity or lighting, it doesn't have sufficient water without those two, it's a big gap in the health sector.' (Female, County Director, Disaster Management, 38 years)

Shortage of essential medications and vaccines: A significant gap encountered in the health facilities situated in the ASAL areas is having to put up with drug and vaccine shortages. Respondents reported that when they visit various health facilities, they find no drugs available, and they are told to buy the drugs, which is a problem itself for they lack the funds to do so. A shortage of vaccines is also there where they mentioned that they lack coolers and electricity to preserve the vaccines. This scarcity hampers the healthcare system's ability to adequately address medical needs and prevent diseases within these regions. The limited availability of essential medications and immunisations poses a substantial obstacle to ensuring the health and well-being of children in arid and semi-arid regions:

'[*T*]his dispensary is not even equipped. It lacks nurses and doctors. There is no single medicine. For the last two years, the dispensary has not been restocked with medicine. But now the problem is even there has been no immunization for the last year. Some of these children are not even immunized. Where do you get the immunization from? There are inadequate vaccines. There is no electricity. They even lack panadol. There is no laboratory equipment even for testing malaria. For any test you have to travel to the county headquarters almost 100 kilometers, there are a lot of challenges.' (Male, Public Admininstrator, 50 years)

Shortage of healthcare personnel: Key informants of the study aired their concerns regarding the number of doctors and nurses who are hired to offer healthcare services. Insufficient healthcare personnel to meet the needs of children and their families create a gap in the provision of essential healthcare services:

'[*T*]his county is vast; we have health facilities which are just being manned by one nurse. And it becomes very hard even for that nurse to leave that health facility, and you know like attend somewhere. So that one also contributes to issues of let me say fatigue and health challenges.' (Female, County Director, Disaster Management, 38 years)

Early learning opportunities

Inaccessibility to the early childhood development centres: The lengthy distances to ECD centres acted as a barrier to the learners accessing early learning opportunities. This creates disparities where some children have access to quality early education opportunities while others do not, leading to unequal starting points in their educational journey. Participants reported that because of the long distances to the ECD centres, parents preferred to keep the children at home for fear of insecurity and attack by wild animals:

'[*T*]here are long distances to ECDE centers. This brings fear that these kids when going there can be attacked by wild animals or even people. There is insecurity.' (Male, Public Health Officer, 48 years)

Inadequate teaching and learning materials: Interviews with key informants revealed that there was a large gap between the needed and the available teaching and learning materials. Subsequent visits to different ECD centres further substantiated this finding. Below are their sentiments:

'[*T*]here are no teaching materials. Teachers don't even have chalks. They even get registers from the primary section. A teacher is given one chalk, and she is told to use it for one week. There are a lot of challenges the ECD face over here.' (Male, Child Protection Officer, 37 years)

'[*T*]here is no enough furniture. No enough learning materials. Teachers are also very few.' (Female, Director at a local organisation, 26 years)

Infrastructure: Insufficient physical infrastructure to support early learning opportunities: While there were ECD centres present, their infrastructure was suboptimal. Teaching and learning occurred in dilapidated structures or makeshift outdoor settings like under trees. Classrooms were overcrowded, accommodating learners across various grade levels. Furniture was insufficient, leading to the sharing of desks among children, while some had to sit on sandy floors:

'… [*W*]e don't have enough classes, the county built only one class which is being shared by the learners that is PP1 and PP2. We teach in the same class. The only things that divide these kids are the rows. This row is for PP2, the other one is for PP1 that is it. The blackboard we divide into two this side for PP1, and the other this side for PP2 that is how we deal with those kids.' (Female, Caregiver, 33 years)

'[*W*]e have a challenge in terms of classes because when we visit their schools some of them, they are just learning under a tree, which is not even a good environment for them, especially for their health you know that area is windy, children are there you know that will bring a lot of upper respiratory infection to them so that is not healthy that is the challenge that they have.' (Female, Nutritionist, 49 years)

Insufficient sanitary facilities: Respondents conveyed concerns about insufficient sanitary facilities in most of the ECD centres. They reported that although available, they were often inadequate and were inappropriate in size for the young learners' use. Furthermore, it was reported that children feared going to those toilets because of not being child friendly. The same toilets were also being used by teachers and bigger pupils in the schools. They also reported that because of the absence of toilets, some children were forced to use nearby bushes to relieve themselves, increasing the risk of exposure to sanitation-related diseases such as diarrhoea and cholera:

'[*T*]oilets are available but, in many instances, it's built to a standard of adults and not children. So, the issue may be the size of the hole, the risk is challenging. Again, in most of these ECDEs, we only have one toilet. The teacher and the pupils

are using the same, it's challenging.' (Male, Programme Coordinator, 43 years)

'[*T*]he county government did build only classes. Learners go into the bush to assist themselves.' (Female, Caregiver, 33 years)

Staffing: Inadequate number of pre-primary teachers

Although the pre-primary teachers were present, there were few compared to the number of learners, and some did not have the required qualifications. Consequently, learners of various ages and grades shared a single classroom resulting in overcrowding:

'[*O*]ne challenge we have here is the shortage of teachers and vulnerability of learners; there are very many ECDE centers compared with teachers who have been employed. You may see a teacher handling a center of 600 children. In incidences where the teacher becomes sick or some other things causes the teacher absence, the school remains closed for some time like a month or so.' (Male, County Director for Culture, Gender and Social services, 45 years)

'[*W*]e also have challenges with teachers, not all ECDE centers have teachers. We are lacking ECDE teachers in most of the centers because the county government did not have enough budget to hire teachers for every ECDE centre. And you see in some cases the county government only employs one or two. So, it becomes a challenge where there are more kids.' (Female, Retired Education Officer, 67 years)

Nutrition

Inconsistent feeding programmes: Feeding programmes within ECD centres in the ASAL areas influence many pastoralists learners' participation in the ECD centres. Participants voiced their concerns about irregular meal supply to the centres, resulting in children's absenteeism and school dropout:

'[*F*]eeding programs affect enrollment, I can recall sometimes back when there was a feeding program, enrollment was high. When the is no food provided, there is an increase in learner dropouts and absenteeism is high.' (Male, ECDE Coordinator, 52 years)

'[*M*]ost of our ECDs lack food and you see in this environment; food is an issue. If food is supplied to the centers, it will improve the attendance of the children. I have an example in one of my ECDE Centers, the enrollment is 209 or 210, but there is a day, I visited the school and found like twenty learners present. Talking to the teacher in charge, she simply said the food was depleted. So sometimes food gives children morale to come to school.' (Male, Village Administrator, 29 years)

Responsive caregiving

Parents' low level of awareness of the importance of early learning: The study participants expressed their concerns regarding parents' low level of awareness of the importance of taking their children to ECD centres. At times, they preferred the young girls to babysit and the boys to herd the animals:

'[*S*]ome children are not enrolled in the ECDE centers at the right age. And one of the reasons is being born by parents who never attended school. These parents don't even know the right age at which a child needs to be taken to school. So, they keep the child at home and bring them to school very late. And sometimes because of the movements, the pastoralist way of life, they're never in town, they're never in centers where kids can access school.' (Female, County Director, Disaster Management, 38 years)

'[*I*]gnorance. Where the parents are not educated, they do not know the importance of education. A man will give her young daughter to her elder daughter maybe who has given birth, so that she can babysit the child. in that process this child, the time she will be back to her mother she will come back when she is 10 years old, you know. then that is the time she will be taken to ECDE classes, meaning she has lost a lot of time taking care of a child, but she is also a child.' (Female, Director at local organisation, 26 years)

Safety and security

Insecurity: Participants in the study reported insecurity to be one of the major barriers that hinder effective ECD programming and service provision in the ASAL areas. They reported that resource-based conflicts, acts of banditry and ethnic clashes often lead to displacement and migration of families. Consequently, the communities affected by insecurity face significant challenges in accessing essential ECD services because the personnel responsible for delivering these services either flee from or are reluctant to enter these insecurity-prone areas:

'[*O*]ne of the challenges I have told you is insecurity. We have people fighting right, left, and center, scrambling over limited resources, what's called resource-based conflict. And that conflict, sometimes it's so bad to even learning institutions. It leads to most of the schools being closed.' (Female, County Director, Disaster Management, 38 years)

'[*W*]e have these conflicts, there is the terrorist kind of terror attacks, especially on the border. There are no teachers they have run away. Even the health workers have also run away. Health and education services are affected. Teachers.' (Male, Programme Coordinator, 43 years)

Factors affecting take-up of early childhood development services and programmes

Inadequate early childhood development financing

Most of the respondents interviewed cited limited budgetary allocations towards the ECD sector as a pervasive factor contributing to the ineffective implementation of ECD programmes and services across most counties. They mentioned that insufficient funding leads to a lack of adequate infrastructure development, insufficient hiring of qualified personnel and inadequate resource acquisition to support the ECD programmes and services in both the healthcare and education sectors:

'[*M*]ost of these arid and semi-arid counties, we give most funding to water, health and roads. Normally ECD gets the lowest allocation. Even the manifesto of the county government, you see is more focused on food security, on health, on drought mitigation, water issues and all those.' (Male, Social and Gender Development Officer, 43 years)

'[*F*]unding is not adequate because there is a lot of competing needs in the county. Because there is drought you find that little money available is set aside for emergencies. We are still fighting for more money to be allocated to ECD.' (Male, Caregiver, 63 years)

'[*W*]e are supposed to give public ECD centers food countywide. However, there are challenges with budgetary allocations. We are supposed to give them for the whole year, but when you see the budget, we can only manage to feed them one term.' (Male, ECDE teacher, 45 years)

Extreme weather events and food insecurity

This theme featured the respondents' perspectives on the effects climate change has had on the provision of various ECD services and programmes in the ASAL counties. Interview accounts revealed that frequent, prolonged drought was a hindrance causing water scarcity, crop failures, conflict and migration. As a result of the migrations, children were reported to drop out of school, miss vaccinations and have poor Water, Sanitation, and Hygiene (WASH) indicators. Climatic changes were reported to exacerbate food insecurity, which led to malnutrition in the ASAL counties.

Respondents reported that early learning was disrupted because of the closure of schools and ECD centres and migrations. They also mentioned that it's challenging for teachers to instruct because of the intense heat and the students' lack of access to water and food. The following are excerpts that depict the impact of climate change:

'[*I*]n this part of Kenya, climate change has manifested itself through frequent droughts. We are now having a prolonged drought, which will lead to depletion of grass, mass migration of livestock from one place to another, scrambling of water in boreholes, lack of water in schools, kids dropping out of ECD centers, and then they have to go with their parents migrating with their livestock. Eventually, the kids will not attend school. And lastly, drought, of course, is the key cause of malnutrition. This is because communities only rely on animals for food and livelihood.' (Female, County Director, Disaster Management, 38 years)

Perennial droughts in the ASAL counties were reported to be a major cause of food insecurity and malnutrition. They caused increases in food prices making most of the households lack the ability to purchase foodstuff and hence lack dietary diversity. Here are the respondents' sentiments:

'[*T*]here is a drought here, there is no food, the little food, which is their prices have gone up.' (Male, Caregiver, 63 years)

'[*W*]e are currently hit by drought. Presently our malnutrition rates are high, and you know now even animals found here are no longer there, there is no milk and most of the animals have died. The children are very weak. Last week I was in the field, and I saw most of the children are malnourished.' (Male, Public Administrator, 50 years)

Interview accounts from the key informants also revealed that water scarcity resulting from persistent drought posed a challenge to the effective implementation of WASH activities in the regions, with children being the most affected.

'[*T*]here is the issue of water. You know in this region the access to clean and safe water at the facility is very low. People in the communities get their water from dams that are not treated. This causes water-related illnesses and water-borne diseases that mostly affect ECD-going children.' (Male, Nutritionist, 40 years)

Nomadic lifestyle

A significant portion of communities living in the ASAL areas practises nomadic and semi-nomadic pastoralism. They move with their herds in search of pastures and water, and this influences their daily activities. These nomadic communities settle in remote regions where establishments like ECD centres and healthcare facilities are absent, leading to a lack of crucial services and resources. Their mobility and distance from fixed infrastructure pose significant hurdles in accessing education, healthcare and basic amenities such as water and sanitation. This also creates a challenge in designing and implementing ECD programmes that are effective and sustainable for nomadic communities.

Due to the migratory nature of the parents in these communities' children in the area are forced to move with them resulting in a substantial gap in accessing available ECD programmes and services:

'These people are nomads. We were even thinking of coming up with mobile ECDE centers. Whereby, if the parents are moving from one place to another in search of pasture or water, they can move with that ECDE up to where they are. You find a school was built, a health facility is there, but there are no children, where are they? They have gone somewhere with their parents in search of pasture and water. So those are some of the challenges we are facing.' (Male, Data officer, 36 years)

'[*W*]e have pastoralists and their children who move a lot. So, these children miss their vaccination. These children are subjected to issues of sanitation diarrhea and other diseases.' (Female, Medical Doctor, 44 years)

Geographical isolation

Interview accounts mentioned geographical isolation within the ASAL as a major hindrance to accessing essential ECD services such as healthcare, sanitation and early learning opportunities. The lack of proper infrastructure, including roads and communication networks, emerged as a significant geographical challenge, impeding timely access to these services. Respondents reported that transportation of food to ECD centres is challenging because of rough road terrains, children having to walk long distances to reach the centres and finally unfavourable topography in some counties:

'[*W*]hen we procure food for delivery to ECDE centers, the cost of transportation is greater than the cost of food. These present logistical challenges in delivering food to these ECD centers especially considering the vastness of the county. Usually, food is transported 600 kilometers away on a rough road, now you can imagine transporting food to that place.' (Female, County Director, Disaster Management, 38 years)

'[*T*]he spread of the population is a challenge. We have areas where a family must travel 30–40 kilometers to get a facility.' (Female, Medical Doctor, 44 years)

'… [*S*]ome challenges include the area topography, which is not so good for the young ones to go to schools, the area is a bit hilly even for playgrounds.' (Female, Nurse, 38 years)

Transect walk results

We conducted a transect walk in Turkana, Lamu and Isiolo counties to validate the data from the interviews. We visited five ECD centres, three county referral hospitals, six dispensaries and one health centre. Observations from the walk reinforced the themes identified in the KIIs. At the ECD centres, temporary structures served as classrooms, but they were substandard and poorly maintained. These facilities were overcrowded as they accommodated learners of multiple grades in one room, and this led to a high pupil-to-teacher ratio. Inadequate furniture forced some children to sit on sandy floors, while insufficient teaching and learning materials further deepened the challenges. Some classes had learners with special needs, but the teachers present lacked training to support them. While sanitation facilities were available, they were inadequate and not child friendly. They had large playgrounds that were poorly levelled and dusty because of the drought season, and there was a lack of play materials. Some centres offered feeding programmes, but they were inconsistent and nutritionally unbalanced. Security was also a concern, as fences were poorly maintained while some relied on natural fences that had dried up, allowing animals to freely graze within the school compounds. Despite these challenges, teachers showed remarkable resilience in their efforts to enhance learning within these settings.

Visits to the healthcare facilities revealed that there were established policies and regularly updated medical records which were submitted monthly. However, staff cited challenges in the effective implementation of these policies because of limited resources. Although MCH services were available, the lack of essential amenities such as electricity posed a challenge, particularly to the storage of vaccines in the interior dispensaries. Healthcare facilities faced shortages of personnel, medical supplies and equipment compounded by water scarcity. Extreme weather events and long distances to these facilities posed a challenge to timely access to healthcare services.

Stakeholder recommendations for strengthening early childhood development programmes in Kenya's arid and semi-arid land regions

To enhance the effectiveness of ECD programmes and services in the ASAL regions, key informants put forth valuable recommendations. Implementing these recommendations could strengthen ECD services and programmes, ensuring the resilience and optimal development of children in ASAL regions (see attached Online Appendix 3 with quotes on the recommendations).

- *Health*: It was recommended that to enhance access to healthcare services, healthcare facilities such as dispensaries should be established in every area of the ASAL areas. Staffing of the healthcare workers to be improved and equipping the facilities with adequate medicines and equipment.
- *Early learning opportunities*: It was suggested that the ASAL counties embrace mobile ECD centres as a way of accommodating the nomadic lifestyle. Creation of awareness on the importance of ECDE among the communities living in the ASAL areas was also recommended in addition to provision of adequate teaching and learning materials.
- *Safety and security*: There is a need to adopt resource-based conflict strategies and prioritise child protection to ensure a safe learning environment. This requires tailored child protection policies, collaboration among government agencies, civil society, and communities, and implementation of peace-building initiatives. Additionally, county governments must safeguard schools and healthcare facilities while providing psychosocial support to affected children and families.
- *Nutrition*: Provide consistent feeding programmes to ECD centres to enhance learners' enrolment, retention and overall child well-being in ECDE centres. Advocate for dietary diversity. Sensitise communities on home food production/kitchen gardening to enhance household food security.
- *Financing*: It was suggested that county governments should allocate more funds to the ECD sector to enable the improvement of infrastructure, hire more ECD personnel and acquire more resources in the education and healthcare sectors.
- *Multi-sectoral coordination of early childhood development programmes*: Effective ECD programming in ASAL regions requires strong multi-sectoral coordination to integrate health, education, nutrition and child protection services. Strengthening collaboration among government agencies, NGOs and community stakeholders ensures a holistic approach to addressing the diverse needs of young children.
- *Policies enactment*: Counties have established various ECD acts and policies, but effective implementation remains crucial. There is a need to strengthen enforcement mechanisms and allocate adequate resources to ensure these policies translate into tangible improvements in ECD services.

Discussion

The study's primary aims were to document existing ECD services and programmes, identify gaps in their provision and highlight barriers and recommendations for future policy and investments in ECD within the ASAL areas. Findings revealed that there were various ECD services and programmes supporting children's needs; however, significant gaps were identified. The gaps ranged from limited access to quality programmes and services, inadequate infrastructure, and disparities in healthcare, nutrition, and early learning opportunities. Key challenges included insecurity, insufficient funding and adverse impacts of extreme weather events, all of which hinder effective ECD programming in the region. The study emphasises the need for targeted policy and investment to address these issues and improve outcomes for children in ASAL areas.

The study revealed that ECD programmes in ASAL counties offer health, nutrition, early learning opportunities, and safety and security services, but they face significant quality gaps. This raises concerns about the long-term developmental outcomes of children in these communities (Black et al. 2017; Britto et al. 2011). Additionally, studies such as those by Tshabalala and Mapolisa (2012) elucidate that children from poor backgrounds face a risk of lagging behind their more privileged peers in the absence of access to quality ECD. Previous studies highlight disparities in both the quality and distribution of ECD services, particularly in LMICs (Britto et al. 2014; Chaudry et al. 2021), emphasising the need to address these quality gaps for equitable development.

Respondents suggested the need for adequate resources, infrastructure and effective policies to improve the quality of ECD services. Quality ECD programmes require well-formulated policies in key components such as nutrition, health and safety, parental involvement, early learning opportunities and stakeholder partnerships. Kenya has established several policy frameworks aimed at strengthening ECD services, including the Children Act (Republic of Kenya 2022b), National Early Childhood Development Policy Framework (Republic of Kenya 2006) and the *Early Childhood Education Act* (Republic of Kenya 2022a). Additionally, the devolved governance structure under the 2010 Constitution mandates county governments to oversee pre-primary education and childcare services, including the development of County Integrated Development Plans (CIDPs) for budgetary planning. Despite these policies, implementation remains weak because of insufficient funding, inadequate infrastructure and coordination challenges across different sectors. These findings align with previous research highlighting gaps between policy formulation and execution in Kenya's ECD sector (Abboah-Offei et al. 2022). Hence, strengthening multi-sectoral collaboration and ensuring quality and equity in ECD services is essential (Black et al. 2017; Britto 2017).

Limited budgetary allocations towards the ECD sector were identified as a significant hindrance to adequate infrastructure, staffing and the ability to implement comprehensive intervention programmes. Investing in ECD programmes is widely acknowledged as one of the most effective ways to break the cycle of poverty, improve health outcomes and foster cognitive and social development (Gertler et al. 2014; Heckman et al. 2010). Although research has underscored the critical importance of investing in ECD (Doyle et al. 2009; Sayre et al. 2015), it remains the most underfunded sector in LMICs (Putcha et al. 2016). This financial shortfall remains an eminent concern for ineffective provision of ECD services and programmes across Africa (Oluwafemi et al. 2014; Putcha et al. 2016; Wangila 2017). This compromises service quality and reach, especially to underserved communities and marginalised populations (Engle et al. 2011). Consequently, many countries continue to fall short of SDG 4.2 (provision of quality services in early years) because of inadequate ECD budgets, hindering the provision of programming in the early years (Putcha et al. 2016; Shawar & Shiffman 2017).

In the early years, the healthcare system has a pivotal role to play, as it is the point of first contact for children and can serve as a gateway to other ECD services. Our research findings highlighted limited access to healthcare services in the ASAL regions as a barrier to ineffective provision of ECD services, particularly those in the healthcare domain. This was attributed to factors such as insecurity; inaccessibility of the health facilities because of vast distances; inadequate medical supplies, drugs and vaccines; insufficient healthcare workforce; poor infrastructure and inadequate funds. Our findings are consistent with earlier studies involving some of the counties in the ASAL areas, such as Garissa and West Pokot, which reported that children in ASAL areas experienced various barriers to access to health services, which included insecurity, distance from health facilities, shortage of staff and lack of essential drugs (Atupamoi 2017; Bakibinga et al. 2022; Kisiangani et al. 2020). Limited access to healthcare services has adverse consequences for child health and well-being, as it results in a lack of regular checkups, immunisations and insufficient prenatal and maternal care, leading to increased MCH risks (Joseph et al. 2020; Karra, Fink & Canning 2017; Mwangi 2014).

Effective implementation of ECD programmes and services in the ASAL counties was reported to be hindered by insecurity. Ongoing resource-based and ethnic conflicts, acts of banditry, cattle rustling and terror attacks pose risks to the safety of children, families and ECD service providers in these regions (Jacklyne, Benson & Washianga 2018; Migosi et al. 2012). The persistent presence of insecurity profoundly hampers efforts to provide healthcare services, nutrition, quality early learning opportunities and overall well-being of the youngest members of society (Goto, Frodl & Skokauskas 2021). Additionally, insecurity can have psychological and emotional impacts on children, hindering participation in ECD programmes and affecting their ability to learn and thrive (Akresh 2016; Goto et al. 2021; Kadir, Shenoda & Goldhagen 2019).

Extreme weather events have far-reaching impacts that directly and indirectly affect ECD programming. In our interviews, the adverse effects of extreme weather events were widely cited as factors that negatively influenced the provision of ECD services in ASAL areas. Severe weather occurrences such as perennial droughts, floods and extreme temperatures negatively impact the attainment of SDGs related to nutrition, health, opportunities for early learning, safety and security, which are fundamental aspects upon which ECD programmes and provisions are anchored (Codjoe & Atiglo 2020; Tumushabe 2018). The consequences of extreme weather events are dire, as they result in water scarcity, food insecurity, resource-based conflicts, displacement and migration,

interrupted schooling and limited access to healthcare (Helldén et al. 2021; UNICEF 2022).

Droughts exacerbate food insecurity, which interrupts feeding programmes, leading to all forms of malnutrition (Akresh 2016; Bauer & Mburu 2017; Nordstrom & Cotton 2020). Similarly, it aggravates water shortages, which compromise hygiene and sanitation practices at the ECD centres and health facilities (Codjoe et al. 2020). Strong winds associated with these events destroy temporary classroom structures in those areas, thus affecting learning. Floods have a direct impact on infrastructure as they damage and cut off roads and bridges, making it difficult for children, caregivers and personnel to access ECD programmes and services. Extreme weather events exacerbate existing resource constraints, thus forcing a shift in focus from allocating adequate funds to ECD programming. Instead, funds are often redirected towards relief disasters, resulting in competing needs and priorities. There is a need to develop ECD programmes that consider the realities of extreme weather events and prepare communities to mitigate these negative effects.

Inadequate infrastructure was mentioned to be an obstacle to the seamless delivery of health and early learning services. Many ECD facilities function without basic infrastructure (Moyo, Wadesango & Kurebwa 2012; Ochieng 2019). Our findings revealed that ECD centres had no adequate physical facilities like classrooms and toilets. The classrooms were dilapidated and overcrowded, resulting in a high child-teacher ratio; there were inadequate teaching and learning materials and inadequate security measures put in place while at the ECD facilities. These findings are consistent with those reported elsewhere (Muganga 2013; Oluwafemi et al. 2014) that inadequate availability of physical facilities hindered effective implementation of ECD programmes. Dilapidated classrooms or overcrowded classrooms pose risks to children's safety and compromise their ability to engage in meaningful learning (Muganga 2013). It is obvious that ECD centres require appropriate classrooms, play areas and sanitary facilities to ensure the physical well-being of children. Notably, limited healthcare infrastructure hampers the delivery of quality ECD services, including health screening, immunisations, nutrition programmes and developmental assessments (Joseph et al. 2020; Muganga 2013).

Inconsistent feeding programmes in the ECD centres were also reported as an issue that made learners miss out on early learning opportunities. It led to low enrolment and retention rates at the centres. These results also concur with those reported by Ejore, Gakunga and Nungu (2020) that feeding programmes among the pastoralist communities play a major role in influencing learners participation in the schools.

Recommendations

Similarly, the recommendations we propose from this study align with stakeholders' priorities, emphasising the need for increased investment in ECD programmes in Kenya's ASAL regions. Key priorities include increased budgetary allocations for infrastructure development, child health and nutrition services. Strengthening health systems with adequate staffing, medicine supply and community awareness campaigns is vital. To increase access, early learning opportunities should be expanded through mobile ECD centres, safe and secure learning environments and the integration of Duksi/Madrassas as formal learning institutions. In terms of safety and security, resource-based conflict resolutions should be reinforced to mitigate the risks of child protection issues. Promoting poverty reduction strategies such as cash transfers and alternative livelihoods will enhance family well-being, ensuring sustainable improvements in ECD outcomes. Furthermore, effective ECD programming in ASAL regions requires strong multi-sectoral coordination to integrate health, education, nutrition, parenting and child protection services. This entails strengthening collaboration among various stakeholders, ensuring effective implementation of existing policies through enhanced enforcement and monitoring mechanisms, along with adequate resource allocation to improve ECD outcomes.

Strengths and limitations

This qualitative exploratory study rigorously documents the landscape of existing ECD services and programmes in the Kenyan ASAL regions, highlighting gaps and barriers to quality service implementation and providing actionable recommendations for policy and investments in the ECD sector in the region. A key strength of this research lies in the diverse representation of various key stakeholders in the ECD sector in the 10 counties. This multidimensional engagement facilitated a comprehensive understanding of challenges in the implementation of quality ECD services and generated insightful recommendations for improving ECD programming in the ASAL areas. The study's methodological robustness is further underscored by the utilisation of multiple data collection approaches, such as in-depth interviews and transect walks, which enabled triangulation and in-depth exploration of ECD programming in the ASAL regions. One prospective limitation could be limited applicability of the findings, emphasising the need for careful interpretation of these results in a different ecological context.

Implications for policy research and practice

This study's findings hold significant importance for policymakers, educators, caregivers and communities, as they reveal challenges, gaps and areas for improvement in ECD programmes. The study findings are crucial for designing effective policies, allocating adequate finances and implementing targeted initiatives to enhance the overall quality and accessibility of ECD programmes. Specifically, the implications of the study findings encompass several key areas. Firstly, in terms of policy formulation and implementation, the results have the potential to inform the development and review of policies to address the unique needs and challenges of ECD programming in ASAL areas. Additionally, insights from the research can guide policymakers in creating targeted

strategies that consider the specific environmental, cultural and socioeconomic factors prevalent in these regions. Secondly, there is a need for allocating adequate funds and resources to increase investment in infrastructure, personnel training and the provision of educational and healthcare services to address the needs of children within ASAL contexts. Furthermore, practical implications may involve improving existing ECD programmes to enhance quality and address barriers to access. Capacity-building initiatives for ECD frontline workers in ASAL areas, including educators, caregivers and health workers, are also essential. Training programmes could be developed to enhance their skills, ensuring quality delivery of early learning opportunities, healthcare and care for young children. Lastly, the research findings can guide the development of monitoring and evaluation frameworks to assess the effectiveness of ECD programmes in ASAL areas, ensuring that implemented policies and practices yield the desired outcomes and positively impact children's development.

Conclusion

This study identified various ECD programmes available in the ASAL regions, but quality gaps hindered their effectiveness in meeting children's needs. Results also revealed significant challenges hindering effective ECD programming. To address these gaps and challenges, there is a need to prioritise increased funding for the ECD sector, improve infrastructure, address security concerns and implement climate-resilient strategies to support the well-being and development of children in arid and semi-arid regions. These efforts are essential to ensure that every child can not only thrive but also transform and reach his or her full potential, regardless of his or her geographical context.

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Competing interests

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Authors' contributions

P.M., A.A., M. Kaniala., J.M., M. Kabu., A.K. and E.J.C. contributed to the conception and design of the study. P.M., A.A., M. Kaniala., B.A., M.E., J.M., S.N., S.G., A.B., J.N. and E.J.C. contributed to the methodology. Data collection and curation were supported by P.M., A.A., M. Kaniala., B.A., M.E. and E.J.C. were involved in various phases of data analysis. P.M. wrote the first draft and received contributions from A.A., M. Kabu., B.A., M.E., J.M., S.N., M. Kaniala., S.G., A.B., J.N. and A.K. in subsequent drafts of the article. All authors read and approved the article.

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Data availability

The data that support the findings of this study are available from the corresponding author, E.C. upon reasonable request.

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