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Nutrition and diet in children with orofacial clefts in Africa: a scoping review

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Abstract

Background and aim The burden of orofacial clefts (OFCs) has declined globally except in sub-Saharan Africa, with a great disease burden in North Africa. Children with OFCs have a high risk of malnutrition, and African countries have some of the highest malnutrition rates. This scoping review assessed the status of research on OFCs and nutrition and feeding among children living in African countries.

Methods We followed the Joanna Briggs Institute guidelines for conducting scoping reviews. We searched eleven databases for articles on malnutrition and feeding among children with OFCs living in African countries. No restriction was done by type of study or publication date. Books, book chapters, and reviews were excluded. Only publications in English language were included. We extracted information about the publication year, study design, setting, location, participants' age, data collection methods, international collaboration, and funding. We classified articles into studies assessing (1) the impact of nutritional deficiencies during pregnancy on OFCs, (2) the impact of OFCs on malnutrition, (3) feeding problems in children with OFCs, and (4) the impact of nutritional status on OFCs repair outcomes. We calculated frequencies and used bar charts and a map.

Results Out of 208 search results, 36 were duplicates, and 25 eventually fit the inclusion criteria, with 52% retrieved from Google Scholar. About 80% of the studies were from four countries: Nigeria, South Africa, Ghana, and Uganda; 72% were hospital-based and 52% were cross-sectional. The most frequent data collection method was clinical examination and questionnaires. Most studies focused on feeding problems in children with OFCs (44%) and the impact of OFCs on malnutrition (32%). International collaboration was observed in six studies, with one study showing South-South collaboration. Only two studies were funded.

Conclusions There is a predominance of under-funded descriptive research not indexed by international databases. Minimal research has been directed to population-level OFC preventive programs in primary healthcare settings and assessing interventions supporting children with OFCs. A research agenda is needed to prioritize research needs and secure funds to support South-South collaboration to address the nutrition and feeding-related problems associated with OFCs.

Keywords Cleft palate, Cleft lip, Malnutrition, Feeding methods, Africa

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Introduction

Orofacial clefts (OFCs) arise when the right and left sides of the lips and/or palate fail to merge during development [1]. OFCs are common congenital anomalies with an estimated incidence of 1 in every 700 live births [2]. OFCs affect growth, development, social and economic well-being [3]. OFCs may lead to hearing loss, speech problems, physical deformity, social isolation, stigma, impaired integration into society [4], and possibly aspiration pneumonia due to food and liquids lodging in the lungs [5].

OFCs are linked with nutrition in several ways. First, maternal nutritional deficiencies can increase the risk of OFCs [6]. The deficiency of folate [4], vitamin B6 [4], zinc [7], niacin, riboflavin, and vitamin B12 [8] during pregnancy was reported in mothers who had children with OFCs. Second, children with OFCs have feeding problems [9] because they cannot generate negative pressure and seal to suck milk during breast or bottle feeding [10]. These feeding challenges are pronounced among children with cleft palate (CP) and bilateral cleft lip (CL) [11–13]. Third, suboptimal intake of milk and nutrients in children with OFCs leads to malnutrition and growth failure, resulting in stunted children who are short for their age and wasted children who are underweight for their height [12]. The prevalence of underweight is lower among children with CP than children with CL, possibly because the risk of death is more significant in children with CP, and children surviving have milder cases of cleft than others [12]. Fourth, the surgical repair of OFCs can reduce the number of deaths due to OFCs-related malnutrition [3]. The timing of these surgeries depends on the type of cleft and the child's readiness [13]. Children must reach a certain weight to withstand the surgical procedure to undergo cleft repair. Failure to reach optimum weight because of malnutrition due to OFCs is an obstacle to the performance of surgery, increasing the likelihood of affected children dying within their 1st year [12]. If corrective surgeries for OFCs are performed on children suffering from malnutrition, there are higher risks of postoperative wound complications [14] such as fistulas [14]. Thus, the child's nutritional status and weight also affect the chances of positive cleft repair outcomes [15].

Recent research shows that the incidence, number of deaths, and disease burden associated with OFCs has declined globally over the last three decades except in sub-Saharan Africa [16]. The most significant disease burden is in the Middle East and North Africa region (MENA) [17]. Although the prevalence of congenital anomalies, including OFCs, in high-income countries (HICs) is greater than in low and middle-income countries (LMICs), like most African countries, the absolute number in African countries is greater because of

the population size [18]. The greater number of OFCs-related deaths in Africa than other regions is possibly caused by higher rates of poverty and poor healthcare [16]. In addition, the prevalence of malnutrition in the sub-Saharan region is high [19]. The Sahel region, extending from Mali to Somalia, has the highest mortality rates due to OFCs-related malnutrition [20]. Children with OFCs in Africa are twice as likely to have malnutrition as children without [3]. African children with OFCs, whether in North Africa (34.7%) or Sub-Saharan Africa (29.4%), had the 2nd highest prevalence of underweight among children with OFCs globally [21]. At a continental level, this double burden of OFCs in North Africa and malnutrition in Southern Africa raises concern about the impact of these health conditions on population welfare and development.

Understanding the scope of research on the link between malnutrition, growth failure, feeding practices, and OFCs in Africa helps generate context-specific evidence to support the development of preventive and care programs and the planning of workforce needs. This scoping review aims to answer the following question: what is the current state of research on the association between feeding problems, malnutrition, growth failure and OFCs in children living in African countries?

Methods

Scoping review design

This scoping review (ScR) was conducted following the Joanna Briggs Institute guidelines for scoping reviews [22] and reported by adopting the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews guidelines (PRISMA-ScR) [23, 24]. The protocol of the ScR was registered at <https://osf.io/4n2ca>.

Eligibility

Only articles were considered, and they were included if they were based on primary studies, if they reported on nutrition-related issues, feeding, or diet, if they were focused on children (18 years old and younger) with OFCs, whether data were directly obtained from children by clinical examination, for example, or indirectly from adults related to the children, like parents, guardians or caregivers by asking about the care they receive using questionnaires, if the participants were residents in an African country, if the articles were in English and if their full texts could be accessed. Search results were excluded if they were narrative, or systematic reviews. Grey literature, including books were also excluded. No publication date limit was set.

Information sources and search strategy

Eleven electronic databases were searched, namely: PubMed, SCOPUS, Google Scholar, the Allied and Complementary Medicine (AMED) Database, Child Development and Adolescent Studies, Dentistry and Oral Sciences Source, SPORTDiscus with Full Text, APA PsycArticles, Psychology and Behavioral Sciences Collection, APA PsycInfo, and CINAHL Ultimate. The search was conducted in August and September 2023. The search strategies and strings used in different databases are in Appendix 1.

Screening and article selection

The search results were exported to the open-source software Rayyan. Duplicate results were identified and removed [25]. Deduplicated results were screened, based on the eligibility to identify articles to be included in the review. The initial stage of the screening process focused on title and abstract evaluations, followed by a full-text review in the second stage. Two reviewers independently screened the search results while the third reviewer acted as an arbitrator to resolve conflicts. To ensure that no relevant article was omitted from the review, the reference lists of eligible articles were screened to identify eligible references for inclusion.

Data charting and extracted items

We extracted the following details from the included studies: authors, publication year (grouped into decades), study location defined by country where the study was conducted, study site (hospital, clinic, or community), study design (cross-sectional, case-control, cohort or interventional), study aim, participants' age, data collection tool (clinical examination, questionnaire, interviews, records, anthropometric measurements or others) and study findings. We also assessed whether the study involved international collaboration, defined as the presence of more than one country in authors' affiliation and whether the study was funded as indicated in the declaration section of the paper.

We classified the studies based on how OFCs were related to nutrition and feeding into studies addressing (1) the impact of nutrition during pregnancy/ before birth on OFCs, (2) the impact of OFCs on malnutrition and growth failure, (3) feeding challenges facing children with OFCs and (4) impact of preoperative weight on surgical repair outcomes.

Analysis

The extracted data were presented as frequencies and plotted in bar charts. A map was used to visualize countries where the studies were conducted.

Results

A total of 108 papers were retrieved from the search in the electronic databases. In addition, a search of the first 100 results retrieved from Google Scholar gave a total of 208 results. After removing duplicates and checking for eligibility, only 25 articles met the inclusion criteria and were included in the scoping review (Fig. 1). Of those 25, 13 (52%) were from Google Scholar. The characteristics of the included studies are in Table 1 [26–50].

Figure 2 shows that sixteen papers [28, 31, 32, 34, 36, 38–43, 46–49], representing 64% of all included papers about OFCs and nutrition and feeding among children in African countries, were published in the decade from 2010 to 2019.

Figure 3 shows that six (48%) of the papers in the review were conducted in each of South Africa [35, 37, 39, 41–43] and Nigeria [26, 30, 47–49]. There were also 4 publications from each of Ghana [34, 36, 44, 46] and Uganda [28, 29, 31, 38]. Thus, 80% of all studies were published by authors from these four countries.

In addition, the greatest number of studies ($n=18$) were hospital-based [28–36, 38, 39, 42–44, 47–49] and five were clinic-based [26, 27, 37, 40, 41]. The total number of participants included in the study was 3,526. Their age ranged from 1 day to 18 years old. The participants in seven studies were adults, parents or caregiver, [33–35, 39, 44, 45, 48] who were asked about the OFCs problems in children.

There were 18 (72%) cross-sectional studies [26–31, 33–37, 39–42, 44, 46, 48], five cohort studies [32, 38, 40, 43, 49] and only one randomized clinical trial [46] testing solutions to feeding problems in children with OFCs [26].

The most frequently used methods of data collection in the included studies were clinical examination [27, 31, 32, 42, 43, 46, 47], questionnaire [26, 29, 31, 41, 43, 46, 47], and interviews [27, 33–35, 39, 44, 45], where each was used in seven studies.

Figure 4 shows that eleven studies focused on the feeding problems and issues associated with OFCs [34–37, 37, 39, 39, 41, 42, 42–44].

There was North–South collaboration in five of the included studies: three with USA-based institutions [26, 40, 45], one with a UK-based institution [28], another with a Belgium-based institution [32]. In addition, there was a South–South collaboration in which authors from Nigeria collaborated with authors from South Africa [49].

Two studies were funded: one from a USA-based organization [45] and another where the lead author received funds from a Belgium-based funding body [32]. International organizations working in the field of OFCs were acknowledged in two studies: Operation of Hope [40], whose role was not explicitly mentioned, and Smile Train [30], who were acknowledged for making their database available for research purposes.

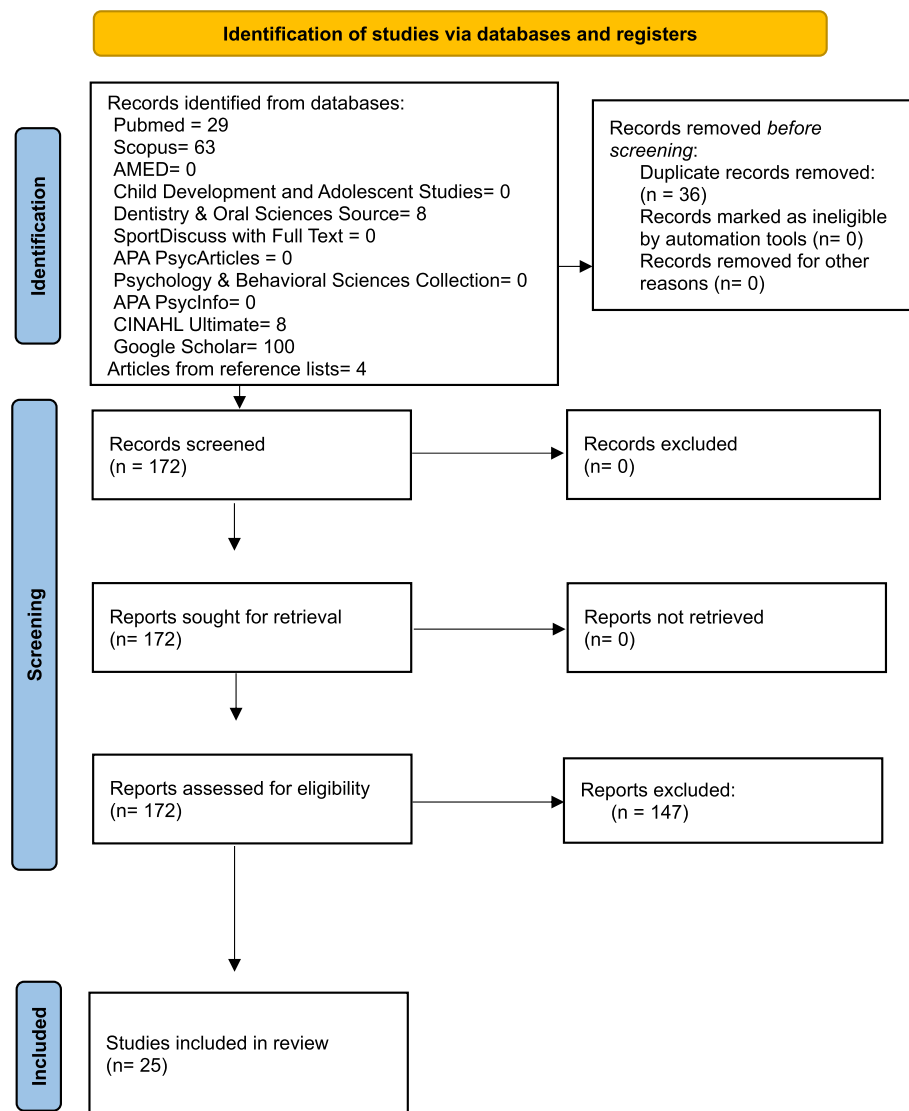


Fig. 1 PRISMA 2020 flow diagram for papers included in the review

Discussion

Summary of evidence

The scoping review showed that the research on OFCs and nutrition and feeding in children in African countries was concentrated in four countries: South Africa, Nigeria, Ghana, and Uganda. Thus, the publications on OFC and nutrition were from Southern, Western and Eastern African countries with only one study from North Africa which is home to a high burden of cleft. The studies were mainly cross-sectional in design, conducted in hospitals, and the majority was published from 2010 to 2019. Most studies focused on feeding issues associated with OFCs and less studies addressed maternal nutrition as a risk factor for OFCs or child

nutritional status' impact on the success of OFCs' repair. International collaboration was not common and mostly North–South, with limited funding and participation from international organizations supporting patients with OFCs in LMICs.

Impact of search strategy

Half the included studies were retrieved from Google Scholar, with fewer papers in the other databases. This finding agrees with previous reports [50] showing that databases such as Scopus and Web of Science under-represented research journals from Africa with differences by country and scientific discipline. Scoping and systematic reviews that do not search Google Scholar

Table 1 Characteristics of included studies

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
1	Adekunle et al. 2020 [26]	Cross-sectional	Nigeria	Cleft clinic	65	1 to 18 months	To survey the breastfeeding practices and challenges among mothers with orofacial cleft babies	Questionnaire	The mothers received no counselling on how to breastfeed. However, 83% initiated breastfeeding although 46% reported the inability of babies to suck as the greatest challenge	Yes	3	USA	no funds
2	Allam & Sobeh, 2021 [27]	Comparative cross-sectional	Egypt	Cleft care clinic	120	4 to 12 years	to assess the prevalence of caries in children with CLP, according to dietary habits, and receipt of dental care	Food diary & clinical examination	A correlation was found between caries experience and sugar intake in-between meals. No effective dental services were received. Higher caries experience was reported in mixed dentition in children with UCLP than BCLP or CL	No	3		
3	Cubitt et al. 2012 [28]	Comparative cross-sectional	Uganda	Hospital	321	< one year	to assess the nutritional status of patients with CL, CL/P and non-CL/P	Anthropometric measurements	The CL/P group had significantly lower Z scores and were more malnourished than the CL group or the non-CL/P group	Yes	2	UK	no funds
4	Nabatanzi et al. 2021 [29]	Cross-sectional	Uganda	Hospital	32	0 to 24 months	To explore maternal perceptions, experiences with breastfeeding and support received for children	Questionnaire, focus group & interview	Breastfeeding practices were sub-optimal. Mothers experienced breastfeeding difficulties, anxiety and social stigma. Support helped mothers cope	No	3		

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
5	Okoli et al. 2023 [30]	Comparative cross-sectional	Nigeria	Immunization & other clinics in hospitals	363	0- > 12 months	To determine differences between children with and without clefts in weight compared to expected weight	Records	Children with combined CL/P had less weight than expected compared to children with CL only or CP only or no cleft	No	2		
6	Tungoto et al. 2017 [31]	Cross-sectional	Uganda	Hospital	44	< 4–10 months	To determine the prevalence and factors associated with malnutrition among infants with CP ± L	Questionnaire and anthropometric measurements	68% were malnourished and 57% had moderate-to-severe malnutrition. Higher odds of malnutrition were associated with parents' not receiving nutrition information, baby having few feeds per day, and having low birth weight	No	2		
7	Mbuyi-Musanzayi et al. 2018 [32]	Case-control	DR Congo	Hospital	162	0 till 1 year	To determine the epidemiology of non-syndromic CL /P (NSCLP) and local teratogenic risk factors	Records	risk factors for cleft include exposure to heavy metals from mining activities, using insecticides and clay consumption during the 1st trimester	No	1		

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
8	Kimotho and Macharia 2020 [33]	Cross-sectional	Kenya	Hospital	24	Caregivers > 18 The age of the children was unspecified	To examine the experiences of parents of children with CL/P, stigma communication, and cultural beliefs associated with CL/P	Interview	Emotional experiences of parents of children with CL/P include shock and surprise, burden of care especially feeding, self-isolation, reaction of the community, and sources of social support	No	3		
9	Bonsu et al. 2018 [34]	Cross-sectional	Ghana	Tertiary health facility	12	Mothers of children with OFC	To explore the reactions and psychosocial experiences of mothers' having children with CL/P in the metropolis	Interview	Six main themes emerged: unexpected event with shock & disappointment, nutritional challenges, emotional reactions with rejection of the child, participation restriction & social isolation because of stigma, losses and support	No	3		
10	Bellardie and Harris 2008 [35]	Cross-sectional	South Africa	Hospital	36	Parents of children born 5 months—16 years previously	To ascertain parents' attitudes to the CLP Parent Information Leaflet (PIL) and to assess the readability of its English version	Interview	The PIL was well designed and easy to read by the average 14 year old. Inadequate information about feeding was common and the leaflet would have helped them at child's birth	No	3		

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
11	Acheampong et al. 2019 [36]	Cross-sectional	Ghana	Hospital	120	10–45 weeks	to evaluate the weight, hemoglobin and surgical repair outcome in children with UCL considering the "Rule of 10's"	Records	Children with UCL with an associated palate and unilateral complete CL had lower hemoglobin and weight than children with unilateral incomplete CL without CP	No	2		
12	Kitzinger, Awt al. 1996 [37]	Cross-sectional	South Africa	Clinic for High Risk Babies	44	3 to 31 months	to describe the early communication skills of infants referred by the University CP Clinic or from the private practice	Assessment of hearing abilities, pre speech and language skills and general development based on a protocol for infants with CP	26% had mild hearing losses and middle ear pathology. There was average developmental levels for perceptual-cognitive, socio-personal and receptive language skills, but a limited phonetic repertoire and a significant expressive language delay. 25% required tube feeding and more than half were bottle fed	No	3		
13	Katusabe et al. 2018 [38]	Cohort	Uganda	Hospital	54	3–192 months	to determine the frequency of palatal fistula after primary palate repair and associated factors	Records	Factors associated with increased fistula formation were cleft width wider than 12 mm, palatal index greater than 0.4, presence of malnutrition at initial assessment and at surgery, two-stage palate repair and postoperative infection	No	4		

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
14	Hlongwa and Rispel. 2018 [39]	Cross-sectional	South Africa	hospital centre	79	17–68 years caregivers The mean (SD) of age was 3.8 (4.3) years	To report on caregivers' perceptions of health service provision for children born with CLP	Interview	Caregivers reported feelings of shock, anxiety, and sadness, exacerbated by the burden of care provision especially for feeding, health system deficiencies, lack of public awareness and insufficient social support services	No	3		
15	Tollefson et al. 2014 [40]	Cohort and cross-sectional	Zimbabwe	Screening clinic	411	1.5 to 2.0 years	To evaluate the prevalence and unmet need for CL/CP reconstructive surgery based on patient's age at presentation and to use GIS for the surveillance of cases with clefts	Online database	The age of presentation in CL/CP remained stable over 7- years, indicating persistent burden of disease. A trend in decreasing age at presentation with isolated CP may suggest the prevalence of unrepai red CP is decreasing due to the efforts of local surgeons and visiting surgical teams. Cleft cases clustered around the capital. Children with isolated CP had significantly lower birth weight than isolated CL and CL/P	Yes	1	USA	no funds

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
16	Mbuyi-Musanzayi et al. 2017 [32]	Cohort	DR Congo	Teaching hospitals	101	3 to 8 months	to determine the outcomes for the nasal-bial area through anthropometric measurements at 1 year after surgery	Anthropometric measurements and clinical examination	The anatomical subunit approximation technique significantly improves the length of the medial and lateral lip and leaves an acceptable scar. BMI was significantly associated with surgical healing disorder	Yes	4	Belgium	funded
17	Hlongwa et al. 2019 [41]	Cross-sectional	South Africa	CLP care centres	699	0–18 year olds	to compare the treatment and care of individuals with CLP across centers	Questionnaire	Although all centres reported a multidisciplinary team approach for CLP care provision, there were gaps in the health professions categories, which influenced the type of treatment provided. Hence, surgical repair of CLP and speech therapy dominated the type of treatment provided. Patients were referred to other provinces or the private sector for other types of treatment. Feeding plate therapy was among the least provided types of treatment	No	3		

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
18	Visser EE et al. 2018 [42]	Comparative cross-sectional	South Africa	Hospital	25	0 to 18 years	To compare the feeding characteristics of infants with unrepaired CLP and HIV-exposure, research group (RG) to infants with unrepaired CLP only, control group (CG)	Neonatal Feeding Assessment Scale assessing alertness, feeding and swallowing	The RG had less weight than the CG with significantly higher % with dysphagia, lower rate of milk transfer per minute and total milk consumed	No	2 & 3		
19	Mzezewa S et al. 2014 [43]	Cohort	South Africa	Hospital	23	3–28 days	To repair CLS in neonates with difficulties in breastfeeding	Clinical examination & questionnaire	Breastfeeding was restored to all patients. Mothers seemed very pleased with their repaired CL babies	No	3		
20	Sommer et al. 2020 [44]	Cross-sectional	Ghana	Hospital	46	Caregivers of children with CLP The age of the children was unspecified	to examine practices regarding CLP among medical professionals and caregivers of children with CLP and to identify barriers and facilitators to comprehensive CLP care	Interviews with qualitative analysis	Barriers to CLP care that were consistent across caregiver interviews and the focus group were lack of knowledge regarding CLP, stigma and cultural beliefs surrounding CLP, transportation, financial, and feeding/nutrition issues. Barriers to care identified in the interviews and focus group were similar; however, facilitators to care varied greatly between the 2	No	3		

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
21	Agbenorku et al. 2011 [45]	Cross-sectional	Ghana	Village	99	20–70 years chiefs and elders and household leaders (with children with clefts) of Wudoaba villages The age of the children was unspecified	to determine the magnitude of CL/P and investigate the causal factors of CL/C/P	Interview	The prevalence of CL/P cases was 6.3 per 1000 population. Genetic homogeneity and vitamin deficiencies may be a causal factor for CL/C/P	Yes	1	USA	funded
22	Ize-Iyamu et al. 2011 [46]	Randomized clinical trial	Nigeria	Unspecified	57	1–14 weeks	to compare weight gain after disposable syringe and cup & spoon feeding in 1–14-week-old CLP babies and compare the findings with a control group of normal babies	clinical examination & questionnaire	Weight gain was greater in CLP children fed with a spoon than with cup & spoon starting from 6 weeks, with less spill and regurgitation. CLP babies fed with the syringe gained the same weight as normal babies at 10 and 14 weeks	No	2		
23	Babalola et al. 2016 [47]	Case-control	Nigeria	Hospital	50	3 to 54 months	to assess the influence of non-syndromic CLP on the nutritional status of children	Questionnaire and examination	The prevalence of underweight, wasting and stunting for cleft group were 26%, 18% and 14% compared to 18%, 14% and 10% for the controls. Among children with clefts, there was a significantly lower % of breastfeeding and a significantly higher % of bottle feeding using infant formula	No	2		

Table 1 (continued)

#	Study	Design	Location	Setting	Sample size	Age	Aim	Data collection tool	Finding	International collaboration	Relation	International collaboration partner	Funds
24	Fadeyibi et al. 2010 [48]	Cross-sectional	Nigeria	Hospital	225	0.3 to 38 years	to assess the prevalence of malnutrition among patients with CLP deformities, the prevalence of anaemia and the burden of bacterial infections	Lab investigations	There was no association between the presence of clefts and malnutrition measured by total serum protein or albumin levels. There was an association between Packed Cell Volume as an indicator of anaemia as well as WBCs as an indicator of the possibility of bacterial infection and types of clefts	No	2		
25	Michael et al. 2023 [49]	Cohort	Nigeria	Hospital	314	5 to 65 months	To determine the trends in cleft surgeries, patterns of cleft surgeries and identify factors related to late primary repair at the University College Hospital, UCH	Records	314 cleft surgeries were performed over 13 years from 2007 to 2019. About 59% of surgeries were for lip repair & 30% for palate repair. Low weight was significantly associated with the hazard or late primary repair of clefts	Yes	4	South Africa	no funds

Relation 1 impact of nutrition on clefts, 2 malnutrition & growth failure, 3 feeding, 4 pre operative weight impact on repair

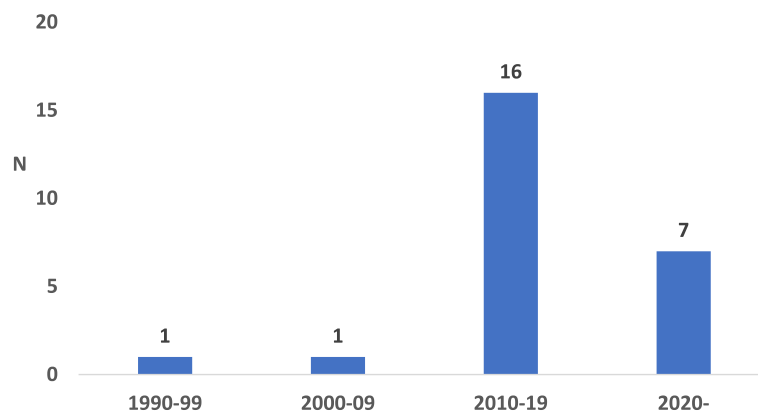


Fig. 2 Number of papers included by decade

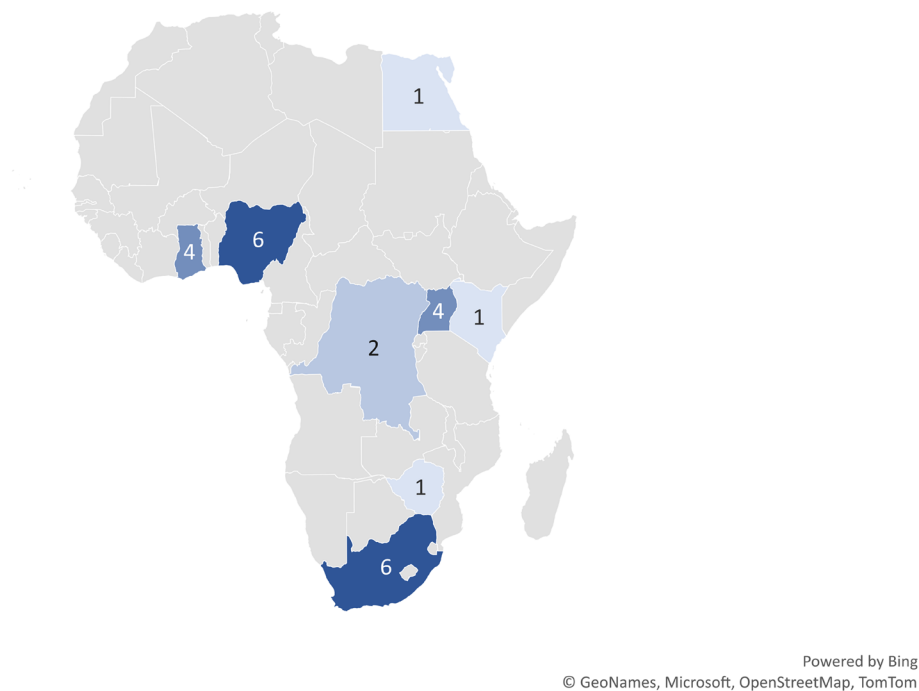


Fig. 3 Map of countries where studies included in the review were conducted

may miss the literature from African countries indexed in Google Scholar.

African countries producing research on OFCs and nutrition

Most studies were from South Africa, Nigeria, Ghana, and Uganda. The most recent estimates of age-standardized rates [51] show that the African countries with the greatest disease burden and highest OFCs-associated mortality were Somalia, Chad, Niger, Mali, and Burkina Faso. Thus, there are scarce published studies from the

countries with the greatest disease burden which limits the possibility of developing context-specific, evidence-based solutions. However, we acknowledge that the exclusion of articles which had restricted access and were published in Arabic, French and Portuguese, which are reporting languages for some of these countries, may explain our inability to access publications from these regions. The limited representation of other African countries agrees with a previous study [52] about biomedical research in sub-Saharan Africa, showing that more than half the publications from 1995 to 2004 in

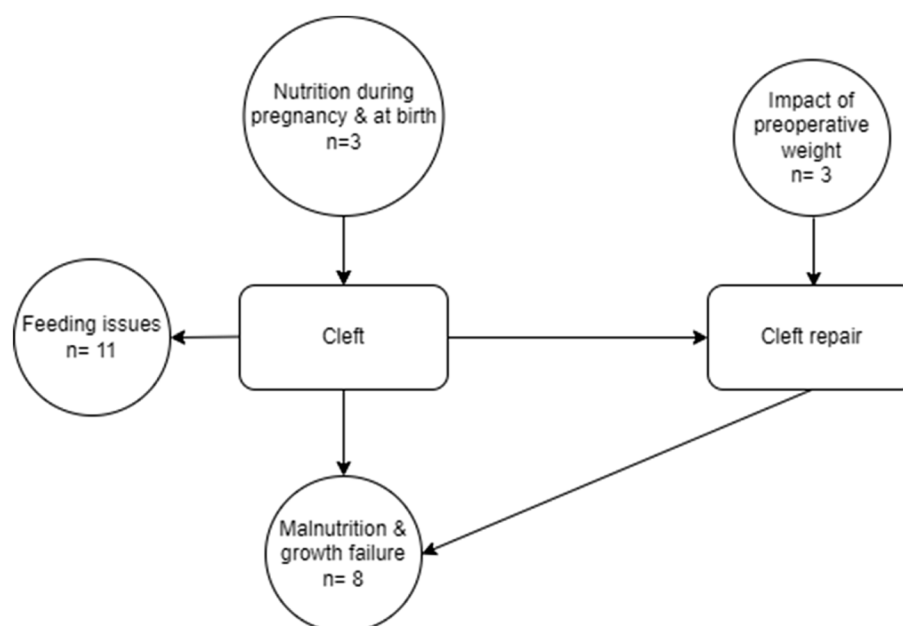


Fig. 4 Number of studies assessing the links between OFCs and nutrition and feeding

MEDLINE were from South Africa and Nigeria. In addition, another study [53] reported that the most populous African countries, Nigeria, Egypt, and South Africa, had the greatest number of publications in Pubmed between 1996 and 2005. For future research, it is important to identify the barriers against publishing on OFCs and nutrition in the countries that direly need evidence to inform policies and practices to address the intersection of OFCs and nutrition.

Setting of studies on OFCs and nutrition

Most studies included in this review were hospital-based, and only one was community-based, which suggests the prominence of hospitals in the OFC's healthcare continuum in African countries. This highlights the importance of conducting research in other healthcare settings to assess how these settings can support parents seeking care for OFCs-associated feeding problems and corrective surgeries. Adopting a screening approach to identify OFCs at birth may lend greater prominence to primary healthcare (PHC) facilities in OFCs- nutrition studies. Only 50% of African countries screen for oral diseases in PHC settings [54]. Ultrasound scans can pick OFCs during the first trimester of pregnancy or within 72 h after birth [55]. Early screening and identification allow for referral and provision of supportive care to improve prognosis [56]. Our findings also show that only five studies used existing records as a source of data about OFCs indicating the scarcity of routinely collected data about OFCs in healthcare settings. Including OFCs among the

list of oral diseases screened for allows the development of registries for surveillance purposes [55]. The WHO recommends collecting data about services identifying and referring children with OFCs in the African region [57]. The World Health Assembly 2010 resolution promoted the integration of screening for congenital disabilities into primary health care [18]. However, it is important to note that screening for conditions that require unavailable care may not be helpful, and this may be true in the case of OFCs, where the highest burden occurs in countries with a shortage of surgical teams [18].

Types of studies on OFCs and nutrition and their links

Only two of the included studies assessed interventions, and most of the other studies were cross-sectional, assessing the magnitude of OFCS-related nutrition and feeding problems. None of the included studies addressed the problem at a population-level by promoting healthcare system interventions despite the large number of at-risk populations and effective interventions that may reduce the risk of disease and its nutrition and feeding-related problems. Implementation science and system-wide interventions are needed to address the association between OFCs and nutrition and feeding problems by strengthening national healthcare systems and building the capacity of local experts so that they can address the problem. This is especially needed given that the international non-governmental organizations (NGOs) are focused on supporting healthcare provision to children affected by OFCs in Africa with minimal involvement in

OFCs-nutrition research. Relying on international NGOs to provide OFCs care is not a sustainable model of care. Building national capacities by promoting South-South collaboration may be the first step toward continued and comprehensive provision of care to OFCs problems. The findings also show an interest in the impact of OFCs on malnutrition and growth failure which was the second most frequent link addressed in the included study between OFCs and nutrition. This aspect has important implication in the fight against malnutrition in Africa and concerned stakeholders may consider concerted action in this area to achieve the Sustainable Development Goal 2.2 calling for ending all forms of malnutrition for under 5 years of age children [58].

Limitations and strengths

The study is limited by the search strategy and including only articles published in English. Manuscripts might have been published in Arabic, French and Portuguese by several countries in Africa. Language restriction excluded manuscripts that may have been published in other languages in different countries in the continent. The study, however, comprehensively searched in several electronic databases and extracted articles to shed light on the link between OFCs and nutrition in African countries. This intersection of congenital and non-communicable diseases will gain increasing importance as the burden of communicable diseases on the continent reduces. The topic is also of great relevance to African countries which have predominantly young population, high prevalence of malnutrition and shortage of trained healthcare professionals.

Conclusion

The study showed that most of the research on the relationship between OFCs and nutrition and feeding in African countries focused on describing the feeding problems in children with OFCs and how OFCs induced malnutrition and growth failure in affected children. The review highlights the need for a context-specific research agenda into the association between OFCs and nutrition and feeding in African countries to generate evidence-based solutions to address this problem.

Abbreviations

OFCs	Orofacial clefts
CP	Cleft palate
CL	Cleft lip
MENA	Middle East and North Africa region
HICs	High-income countries
LMICs	Low and middle-income countries
PRISMA-ScR	Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews
AMED	Allied and Complementary Medicine
PHC	Primary healthcare
NGOs	Non-governmental organizations

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-024-05130-8>.

Supplementary Material 1

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None.

Authors' contributions

KKK conceived the study. The Project was managed by MET. Data extraction and screening was done by KKK, SMA, AHE and IA. Data analysis was conducted by MET. MET developed the first draft of the document. All authors read the draft manuscript and made inputs prior to the final draft. All authors approved the final manuscript for submission.

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Data availability

All data generated or analysed in this study are included in the paper.

Declarations

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

Morenike Oluwatoyin Folayan and Maha El Tantawi are Senior Editor Board members with BMC Oral Health. All other authors declare no conflict of interest.

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