Contribution of home and school environment in children's food choice and overweight/obesity prevalence in African context: Evidence for creating enabling healthful food environment

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Abstract

Background Informed dietary choices during childhood is necessary for building good eating habits in the present and future generations. There is a significant increase globally in trends of over nutrition, specifically, overweight and obesity among school children in Africa calls for consideration of home and school environments. Methods A systematic literature search was conducted between October to December 2018 using Medline (PubMed), Directory of Open Access Journals and Google Scholar databases. Also, a grey literature review was conducted to identify and retrieve relevant documents and reports some of which from websites of international organizations. Major topics of interest were home and school food environments, dietary choices, school children and Africa. Out of 318 articles 30 were included in the full text read after meeting the inclusion criteria such as focusing on school children in Africa. Four reports from grey literature were also included. This review includes articles published between the 1st January 2008 and 30th June 2018. Results Available data from reviewed articles showed that obesity prevalence among school children in Africa is on the rise and ranges from less than 5% to more than 30% across countries. Few articles investigated the contribution of home and school environments on school children's food choices which necessitates more research in this area. Conclusion Therefore, this review suggests that for effective implementation of childhood overweight and obesity reduction strategies, investigation of home and school determinants of children's food choices is imperative.

Background

In recent decades increased and accelerated prevalence of obesity and non-communicable diseases which were previously experienced by affluent countries are now evident mostly in urban areas of low and middle-income countries at a faster rate compared to developed countries, [1–4]. Overweight and/or obesity is referred to excess accumulation of fat in the body which is a precursor for non-communicable diseases [5–8]. Globally, there are about 42 million overweight children with over 35 million living in developing countries [9]. In Africa, despite high levels of undernutrition, overweight and obesity rates in children are increasing and alarming [8]. Africa has nearly doubled in the number of obese children from 5.4 million in 1990 to 10.3 million in 2014 [10], a pattern often attributed to limited policy support and lack of multisectoral collaboration [3].

In sub-Saharan Africa the prevalence of overweight and obesity is more than 10% in many countries [8]. A number of studies have reported high and growing prevalence of more than 20% in childhood obesity across African nations, such as South Africa [11], Ghana [12], Nigeria [13], and Lesotho [14]. In Uganda prevalence was reported to be over 30% [15], whereas studies in Zimbabwe and Tanzania found a prevalence of less than 10% (see Table 2). Overweight and obesity in children have devastating physiological consequences, namely high cholesterol and high blood pressure, high risk of impaired glucose tolerance, insulin resistance, type 2 diabetes, breathing problems and fatty liver disease [16–18], as well as psychosocial consequences, such as stigma, teasing, and harassment [1,19].

The food environment across countries is in a state of rapid transformation, which is contributing to overweight and obesity levels due to changes in dietary patterns and food behaviors [20–22]. The food environment is rooted in the recognition that an individual is surrounded by broad dimensions of obtaining and consuming food. It encompasses the extent to which someone accesses available food which is desirable and convenient, the way food is marketed, and exclusive properties of food, such as taste and appearance [23, 24]. Processed, convenient, and relatively low prices foods are now readily available in many settings [25]. Globally, a number of studies [26, 27, 2, 28] reported the contribution of school food environment (through availability of unhealthy foods and soft drinks) on children's food choices. Along with strong peer pressure, children feel forced to buy and consume these unhealthy food alternatives [28].

School children and adolescents require adequate nutrient and energy inputs for growth, development, and good academic performance [29–31]. Appropriate dietary choices and dietary intake are crucial for building good eating habits [30, 32]. Thus, healthy eating habits that develop early in life are essential as they potentiate a holistic future relationship with food [33]. Eating habits developed during childhood may have long term implications; therefore, environments associated with children's food choices need to be identified and understood to enable for modification or reinforcement of healthy choices. Foods that are high in sugar and/or fat, which are globally available in school environments, are associated with increased risk of obesity [34], and consumption of these foods is reported to increase at the highest rates ever [35].

Escalating overweight and obesity rates in school children necessitates consideration of both home and school environments as potential contributors due to their influence on dietary related behaviors [20, 36] and also to study the basis of overweight and obesity in children [37]. Children spend significant amounts of time (i.e., 6–9 hours) in the school environment daily which may influence their food choices and shape their attitudes towards foods offered in the school [38]. Thus, schools provide a critical opportunity for promoting healthy food choices and optimal dietary behaviors [37, 38, 39, 40, 41, 42]. There is inadequate data on dietary intake and food choices in school children, especially in African settings [32].

The home environment (through physical presence of food and television advertisement) also influences children's food choices [43]. For example, Couch and colleagues [44] reported availability of unhealthy foods in the home has been associated with lower intake of fruits and vegetables. Wang et al. [45] found that the home environment is responsible in shaping children's lifelong eating habits. At home, parents play a key role in children's exposure to foods [46].

To the best of our knowledge no review of existing literature has investigated obesity prevalence and the contributions of school and home environments in children food choices and dietary habits in the African context. Therefore, the objectives of this review article are (i) to review the existing literature on current trends of overweight and obesity in African context to determine the contribution of home and school environments to children's dietary choices and (ii) to suggest strategies for creating enabling healthy home and school food environments for school children in the African context.

Methods

A literature search was performed systematically to identify existing research articles that reflect the contributions of home and school environment on school children's food choice, dietary habits, and overweight/obesity trends in the African context. In addition, articles and reports on strategies for improving children's healthy food environments were also searched.

Search strategy, study selection and data extraction

The following databases were included in this review: Medline (PubMed), Directory of Open Access Journals (DOAJ) and Google Scholar. Selection of "grey" literature, which contained relevant information on strategies to improve healthy food environment for school children, were consulted. For example, reports/documents from the Tanzanian Ministry of Health on behavior change communication, the national nutrition action plan, as well as relevant Food and Agriculture Organization and World Health Organization reports were downloaded. A manual search was also conducted from the reference lists of articles obtained from the databases and direct from the databases. Due to lack of enough knowledge on contribution of home and school environment on children's food choice and the need for future research on this topic, a narrative review was proposed [47, 48]. This review includes articles published over the decade, from the 1st of January, 2008 to the 30th of June, 2018 with the exception of a few reports from "grey" literature which were considered beyond the specified period because they contain relevant information. Key search terms were developed and used either singly and/or in combination. These terms included food environment, school environment, home environment, dietary habits, food choice, determinants, factors, school aged children, overweight, obesity, developing countries, and Africa. After refining the inclusion and exclusion criteria, abstracts and full articles of all eligible studies were read.

Table 1: Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
Address school children aged 6-18 years	Under 5 years children and above 18 years
Within 10 years of publication	More than 10 years of publication
Use of human subjects	Use of animal subjects
Written in English language	Written in other languages
Within African context	Developed and other developing countries
Address childhood overweight, obesity	Addresses other nutrition problems
Reflect home and school physical environment	Reflect other areas such as community, socio-cultural, economic aspects
Original articles	Review articles, conference proceedings, correspondence letters, book chapters

Figure 1. Flow chart for the inclusion of eligible studies

Results

Description of included studies

Of the 318 articles identified, 22 investigated the prevalence of overweight and obesity in African countries, and 8 articles reported on the influence of home and school food environment on school children food choice. Grey literature (4 reports) provided insights on strategies to creating enabling healthy food environment for school children. Twenty one of the reviewed articles on overweight and obesity used a cross-sectional design with the exception of one longitudinal study. Six of the articles on school and home environment used qualitative methods except 2 which used a mixed methods approach.

Overweight and obesity trends among school children in Africa

Evidence from reviewed articles (Table 2) showed diverse trends of overweight and obesity among school children across African countries. In South Africa, prevalence rates varied considerably. According to author [49] reported 5% prevalence of overweight while [3] found an increase of 4% between baseline and follow-up (from 12. 5% to 16.7%). Another study by [11] reported a prevalence of 20.9% for overweight and 9.8% for obesity. In Nigeria's Benue state, prevalence of overweight and obesity in adolescent and children was 9.7 % and 1.8% respectively with rates being higher in children than in adolescents [5]. In Kano state, [13] reported a prevalence of 19.8% for overweight and 0.84% for obesity, while [50] reported 8.9% and 3.3% for respectively. [51] reported 10.3% overweight and 1.7% obesity in North Central Nigeria. In Ghana, [12] found a high prevalence of overweight and obesity in both girls and boys where 33.3% of girls and 26.0% of boys were overweight, while 27% of girls and 26% of boys were obese. This finding varied from the earlier work of [6] which reported overweight and obesity of 15.8% and 10.9% respectively, where girls were 2 times more likely to be obese than boys. In Cameroon, [7] reported an overall prevalence of childhood overweight of 12.4% and obesity 1.9%. In Lesotho, 27.2% of girls and 8.3% of boys were found to be overweight [14]. In Zimbabwe, prevalence of overweight and obesity in children was 7.7% and 6.0% respectively [4], while 11.9% of school children were reported to be overweight and/or obese in Ethiopia [8].

In East Africa, evidence shows that childhood overweight and obesity trends have increased at an alarming rate. Kyallo and colleagues [52] through their study in Kenya found a prevalence of overweight and/or obesity to be 19% in school children in which girls were more likely to be overweight/obese (21%) than boys (16.8%). In Uganda, 32.3% of children were overweight and 21.7% were obese [15]. In a national survey of two countries (Uganda and Ghana), prevalence of overweight and obesity in girls was 10.4%, significantly higher than their male counterparts (3.2%) [53]. Tanzania, like other East African countries, is not immune to the growing problem of overweight and obesity in school going children as reflected by a number of studies done across the country. A study [54] found the prevalence of 4.2% overweight and

5.6% obesity for children aged 6–9 years in Dodoma region while in children aged 10–12 the prevalence was 4.9% and 3.9% respectively. In Dar-es-Salaam region, the same study [54] found 8.6% for overweight and 6.3% for obesity in 6–9 years children while, for those aged 10–12 years, the prevalence was 5.8% for overweight and obesity. Muhihi and colleagues [55] conducted a study in Dar-es-Salaam and reported a prevalence of 9.8% and 5.2% in overweight and obesity, respectively with the prevalence being higher among girls. A prevalence of 10.2% and 6.7% for overweight and obesity respectively was reported by [56] with a small gender variation. Prevalence of 20% in overweight and obesity in Kilimanjaro region was reported among children aged 10–12 years [57]. A study by [58] in Dar-es-Salaam found prevalence of childhood overweight and obesity to be 15.9% and 6.7%, respectively. A study by [59] in Manyara region reported a combined prevalence of overweight and obesity of 9.2% among adolescents.

Table 2. Summary of evidence on prevalence of overweight and obesity in school children and adolescent in selected African countries (OV-overweight, OB-obesity)

Author	Year	Country, Region	Age (years)	Study design	Sample (n)	Prevalence of overweight/obesity (%)
Pienaar	2015	South Africa, North-west province	6-9	Longitudinal	574	OB 12.5 baseline; OB 16.6 follow-up
Baard & McKersie	2014	South Africa, Port Elizabeth	7-10	Cross-sectional	713	OV 20.9, OB 9.8 Boys: OV 18.5, OB 6.9 Girls: OV 23.3, OB 12.9
Umar et al	2018	Nigeria, Kano state	6-10	Cross-sectional	720	OV 8.9, OB 3.3 Boys: OV 7.0, OB 3.0 Girls: OV 10.9, OB 3.6
Yusuf et al	2013	Nigeria, Kano state	13-18	Cross-sectional	718	OV 1.98, OB 0.84
Puckree	2011	S.Africa, Kwazul-Natal	10-12	Cross-sectional	120	OV 5
Kambonda & Sartorius	2018	Zimbabwe, Mashonaland	6-12	Cross-sectional	974	OV 6.0, OB 7.7
Kyallo et al	2013	Kenya, Nairobi	9-14	Cross-sectional	344	OV+OB combined 19.0 Boys: OV+OB 16.8 Girls: OV+OB 21.0
Annan-Asare et al	2017	Ghana, Accra metropolis	11-15	Cross-sectional	260	Boys: OV 26.1, OB 26.0 Girls: OV 33.3, OB 27.0
Musa et al	2012	Nigeria, Bene state	9-16	Cross-sectional	3240	Adolescents: OV 9.7, OB 1.8 Children: OV 18.3, OB 3.2
Wamba et al	2013	Cameroon, Douala	8-15	Cross-sectional	2689	OV 12.4, OB 1.9
Van den Berg et al	2014	Lesotho, Maseru	16	Cross-sectional	221	Boys: OV 8.3 Girls: OV 27.2
Mohamed & Vuvor	2012	Ghana, Accra	5-15	Cross-sectional	270	OV 15.8 OB 10.9 Boys: OV 16.7, OB 7.2 Girls: OV 15.0, OB 15.0
Ofakunrin et al	2018	Nigeria, Jos north central	6-13	Cross-sectional	600	OV 10.3 OB 1.7
Peltzer & Pengpid	2011	Ghana & Uganda	13-15	National data survey (secondary analysis)	5613	Boys: OV+OB combined 3.2 Girls: OV+OB combined 10.4
Chebet et al	2015	Uganda,	8-12	Cross-	958	OV 32.3, OB 21.7

		Kampala		sectional		
Mosha & Fungo	2010	Tanzania, Dar-es salaam & Dodoma	6-12	Cross-sectional	428	OV 5.8, OB 6.4 in 6-9 yrs OV 4.9, OB 5.4 in 10-12 yrs
Muhihi et al	2013	Tanzania, Dar-es salaam	6-17	Cross-sectional	446	OV 9.8 OB 5.2 Boys; OV6.3 OB 3.8 Girls; OV13.1 OB 6.3
Mwaikambo et al	2015	Tanzania, Dar-es salaam	7-14	Cross-sectional	1722	OV 10.2, OB 4.5 Boys OV+OB comb 14.9 Girls: OV+OB comb 14.5
Pangani et al	2016	Tanzania, Dar-es salaam	8-13	Cross-sectional	1781	OV 15.9, OB 6.7 Boys: OV 12.1, OB 4.0 Girls: OV 18.7, OB 8.0
Kimario	2015	Tanzania, Kilimanjaro	10-12	Cross-sectional	140	OV+OB 20
Tluwat et al	2018	Tanzania, Manyara	10-19	Cross-sectional	619	OV+OB 9.2

Influence of school and home environment

Eight African-based studies investigated the contributions of school and home environments on children's food choices and dietary habits (see Table 3). A study in Malawi [60] published a cross-sectional quantitative data, which showed that more than 80% of children had access to sugar-based soft drinks, especially home-made drinks consumed at home or at school. Brown et al. [61] did a qualitative study in Botswana with parents and children regarding their food perception and choice. In Tanzania, a cross-sectional quantitative study reported that most of foods sold in school environment were high in energy and high calorie, such as snacks and soft drinks. However, mean cereal intake was acceptable; however, mean values for availability/inclusion of fruits, vegetables, and dairy products were found to be low [62]. In South Africa, two qualitative studies [63, 28] found that perceptions towards healthy eating are influenced by home and school environment. A mixed methods study [64] focused on perceptions of healthy eating in the school and home environments which suggested that availability of health food options improves children's food choices. Abrahams et al. [65] through a quasi-experimental design, found an association between lunch boxes brought to school with lower BMI of the students compared to those consuming foods purchased from school tuck shops. In Mauritius, a cross-sectional quantitative study revealed that the school food environment provides few healthy food varieties [38].

Table 3. Summary of studies on influence of school and home environment on children food choice in selected African countries

Study	Country	Environment	Description of findings
Kalimbira and Gondwe, 2015	Malawi	School & Home	Many school children consume more sugar-sweetened beverages, carbohydrate rich foods, before going to school, at school and after school
Brown et al., 2015	Botswana	School & Home	Parental control dictates what a child eats; eating out exposes a child to junk foods; peer pressure influence on food choice; energy dense foods are readily availability in school shops
Itatiro, 2014	Tanzania	School	Food vendors around school environments formed the main food suppliers, followed by school shops, canteens, main foods supplied were snacks and soft drinks, while fruits and vegetables were less available.
Sedibe et al., 2014	South Africa	School & Home	Role of caregivers in preparing healthy foods through availability of home gardens; adolescent perception on healthy foods; barriers to access healthy foods
Bekker et al., 2017	South Africa	School	Presence of healthy food varieties in school tuck shop influenced a positive attitude and perceptions towards healthy eating although unhealthy options should also be available.
Kupolati et al., 2017	South Africa	School	Teachers perceived that nutrition education can influence positive healthy eating habits in school environment
Abrahams et al., 2011	South Africa	School	Children who brought lunch boxes to school comprised of healthy food options had lower BMI compared to children who bought food items from school shops
Chan San et al., 2009	Mauritius	School	Confectionaries and deep-fried foods soft drinks and desserts were most commonly sold (by more than 75%) followed by main meals from canteens and from food vendors; healthy foods like dairy products and fruits were also available

Discussion

Overweight and obesity trends in school children

Obesity is now established to have reached epidemic levels in developing countries [54] unlike previous reports that showed it was restricted to developed countries [58]. Different studies in Africa have shown an upward trend in obesity from the lowest reported at 5% to the highest at above 30% among school children across the period of 10 years which this review considered. This trend is almost similar to what

was reported in developed countries and some other developing countries in the global south. For instance, in Latin America more than 20% of school children were obese [66] and in San Diego the prevalence of overweight and obesity in children was 26. 6% [44]. Similarly, high prevalence of overweight and obesity (39.7%) were found in Mexican school children [67] while 31% of Canadian [68], 36.6% of Saudi Arabian [69], and 32% of American [45] school children were reported to be overweight and obese. Since 2013, published articles showed increased figures of overweight and obesity compared to articles published before 2013 [3, 12, 51]. However, data on overweight and obesity are complex and confusing due to different contexts and age group under investigation. Some evidence showed that cultural and environmental factors may explain variation in obesity data among study subjects [22, 51, 58]. Difference in socio-economic status also contributed to these variations, as children from higher SES are reported to be more obese than children from lower SES [8, 11, 51, 70]. Children from urban areas were found to be more obese than children from rural areas in Tanzania, with Tluway et al., (59) reporting a lower prevalence of overweight and obesity (9.2%) in rural adolescents of Tanzania compared to urban children at 22.6% [58]. Similarly, Zhang et al. [71] found an increased risk of overweight and obesity in urban Chinese school children, which may be caused by difference in lifestyle behaviors between rural and urban settings. Generally, most urban populations have sedentary lifestyles and increased consumption of high energy dense foods [55, 72]. Many studies across countries reported higher prevalence of overweight in girls compared to boys [6, 11, 12, 14, 50, 52, 53, 55, 58]. This may be attributed to differences in gender roles where boys participate more in higher energy utilization activities than girls [51]. Early onset of menarche in girls is associated with an increase in body fat and body weight [59]. In addition, children below 10 years were more likely to be obese than children/adolescent above 10 years [5, 54]

Home and school food environment

There is limited information on the influence of home and school environment on school children's food choice and obesity linkages. However, reviewed studies have demonstrated that obesity is a significant health problem and provide direction for evidence-based strategies and interventions.

Apart from biophysical factors (i.e., genes, age, gender), the ecological perspective states that the physical environment has a direct link to obesity due its influence on food choices [2]. Studies from South Africa reported that school children buy and consume unhealthy foods near school premises [37], which calls for creating enabling healthy food environment. Evidence from Brazil showed that public school students are exposed to food stores which provide fewer natural foods but rather energy dense-foods [66]. A mini-review on Indian school children's food environment also reported high access of school children to low cost energy dense foods like refined carbohydrates, saturated fats, and sugar sweetened beverages [27].A systematic review reported that fast food shops and cafeteria located in school environments in developing countries give students access to high caloric, nutritionally inadequate foods [73]. Availability of empty-calorie foods at school and home have direct links to poor food choice and consumption [2]. Conversely, [69] found a positive association between increased intakes of sugar-

sweetened carbonated beverages with increase in BMI, contributing to obesity-related outcomes in Saudi Arabian school children. This finding is similar to a study conducted in San Diego [44] where a positive association was found between unhealthy foods available at home and high intake of caloric beverage while the intake of fruits and vegetables were low. However, a study conducted in the Southern Appalachia found availability of high fats foods and sweets in the home environment have less effect on child's overweight status if there is strict parental control [45], which was also shown to influence healthy food choices during adolescence and adulthood [29]. This finding is similar to a study among Irish children which revealed that parents had the most significant control of what a child chooses to eat [30]. Findings from other review articles found that parents have more influence to determine food amount/portion size to be offered to children, however, decision, motivation and parental feeding goals are not well understood [74]. Presence of parents at home and their involvement in feeding practices apart from influencing role modeling, they also shape positive behavior change and modification of available foods and soft drinks in the home environment [75].

Strategies to creating enabling healthful food environment

- Conducting informative research

Effective implementation of optimal intervention strategies to prevent obesity in the African context needs sufficient evidence on current and periodic trends of obesity across countries [76]. Knowledge about food choice and dietary habits data among African school children is inadequate, therefore, more consumer research on school and home food environment is required. Studies in developing countries need to examine the role of local or informal food vendors and other sources of food like home production and food donations on food choice [24]. There is a need to focus on the penetration of supermarkets which offer highly processed food varieties [24]. Nevertheless, before launching school-based interventions in low and middle-income countries, we need to establish culturally based evidence. This is because of differences in values, norms, customs, and environmental influences on food choices for children and the existing models from developed countries may not work in the African context [77]. Barriers and facilitators influencing healthy eating behaviors in the home and school environment need to be thoroughly investigated as little research exist in this area. Context specific school-based interventions, if implemented effectively, can improve the nutritional status of school children.

- Designing social ecological frameworks

The social ecological perspective describes relationships between an individual and environment positing that individual behavior emerges from the interplay of multiple factors between the two entities [78]. The social ecological framework considers five levels of influence: Individual ((knowledge, attitude, and self-concept); Interpersonal (family, peers, friends, social networks); Community (relationships between organizations); Organizational (organizations and social institutions); and Policy/enabling environment (national, state, local). At the individual level, school children need to receive nutrition education to equip them with appropriate knowledge to make informed healthy food choices, and change their attitudes and

skills to build self-efficacy [63, 79]. At the interpersonal/family/home level, training of parents and modification of home environment is required. It is also imperative to create awareness through health promotion campaigns targeting parents, households, and communities on health diet and dietary diversity. Dietary diversity should promote consumption of nutrient-dense culturally acceptable foods and minimize consumption of processed foods [80]. Parents have the role to model healthy eating habits and food choices, because they impact what their child consume. Parents should be well informed on the outcome of poor dietary habits of their children; therefore, they should be motivated to set a good example for their children. [74]. At the organization/school level, teachers are capacitated to deliver nutrition education and communication messages to pupils. Promotion/modification of school food policy/environment and creating resources for physical activity can easily be designed and implemented at school level. National and local levels are obliged to set policies and laws that will promote the creation of healthful food enabling environment.

- Multisectoral partnership/coordination

Prevention and/or management of overweight and obesity in children is a shared responsibility between different sectors. No single sector will address this complex, multi-faceted problem. African member states (i.e., governments) should be willing to take responsibilities through preparation and enhancement policies across all sectors [10]. The health sector needs to initiate, implement, and innovate primary and secondary overweight/obesity preventive measures. The education sector needs to integrate and implement nutrition related courses in primary school curriculum [81], with content delivery predicated on the building of teachers' capacities, thereby equipping them to confidently and consistently deliver nutrition education to children. The agriculture sector needs to emphasize on production of local nutrient-dense food crops at an affordable cost together with periodic revision of import trade policies [10]. Food regulatory bodies are tasked to set and enforce import requirements and regulations to ensure that imported foods meet agreed quality standards [82]. In addition, the business sector (food and beverage industry) need to focus on healthy product development, whereby they reformulate nutrient dense food categories to deliver better diets for all. Due to industrial development and economic changes many people have shifted their food habits leading to a tendency to purchase and consume more processed, packed foods and drinks, while minimizing intake of fruits, vegetables, whole cereals and legumes [41], contributing increased intake of high energy giving foods. Therefore, this sector needs high level of commitment in addressing global and regional nutritional challenges by manufacturing healthy products that are affordable and available to all groups of consumers.

- Social behavior change communication

One of the most promising strategies to prevent childhood obesity is social behavior change communications. This strategy includes individual counselling, mass media campaigns, and education sessions. If these are targeted to relevant audiences, like school children, schools, non-governmental organization, and decision makers, the expected outcomes may be achieved [47]. An example of this approach is reflected in Tanzania's national nutrition social behavior change communication (SBCC)

strategy which aims at raising awareness through an increase in knowledge, attitude, and skill training. It also aims at creating quality nutrition services that will favor demand of consumers, other beneficiaries and increase access to quality communication materials, SBCC guidelines, protocols, and other tools to district level [83]. SBCC needs to be developed, pre-tested, and disseminated to target population. A review of literature in developing countries showed success on integrating social behavior change communication interventions with nutritional specific programs [84]. For example, a study conducted in Malawi used social behavior change communication messages in a supplementary feeding program which resulted in knowledge and practices improvement among caregivers in the intervention groups compared to control group [85].

Limitations of this review

This review is restricted to school and home physical food environment, specifically focusing on availability and accessibility to foods. Other components, like individual, socio-cultural factors, presence of electronic devices, and physical inactivity/sedentary behaviors, were not considered. However, they are all factors which potentially contribute to increased prevalence of overweight and obesity in school children. Again, the review focused mainly on overweight and obesity among school children, while the double burden malnutrition (under and over nutrition) is evident in African countries. This review focuses on a topic which, in most cases, receives less attention in nutrition research and interventions than the undernutrition profile.

Conclusion

This review focused on the contributions and strategies to enable healthier school and home environment in school children's food choices, dietary habits, and obesity trends in African context. Overweight and obesity is rapidly increasing in recent years, but studies focusing on determinants or correlates for this problem are still limited, thus jeopardizing efforts to suggest context specific strategies. This epidemic is reported to be higher in urban areas, in girls, and in private schools, which is a pattern reported in developed countries. The presence of high energy dense foods in school and home environment contributes to unhealthy dietary choices in school children which, in turn, may subject children into dietary related chronic problems including overweight and obesity. However most of the articles reviewed were methodologically limited as they involved 'one-off' cross-sectional design studies as opposed to longitudinal, case-control, and controlled randomized trials. A number of studies identified on dietary choices and habits used qualitative approaches, which highlights the appropriate strategies linked to subjects' perceptions, ideas, and opinions. Developing appropriate strategies and informing policy change will potentially improve and create a more healthful food environment. In addition there will be informed food choices, and ultimately reduction of the burden of overweight and obesity in school children and in adults later in life. This finding will have an implication in the reduction of non-communicable diseases as well.

Declarations

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Consent for publication-

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Authors' contribution—

Renatha Mchongi Pacific involved in conceptualization, prepared the first review draft, proofread it and ensured that all authors approved manuscript before submission. Martin Haikael substantively revised manuscript. Kulwa Kissa substantively revised the manuscript, provided technical assistance. Petrucka Pammla revised manuscript extensively, provided technical advice and grammar check. All authors read and reviewed the manuscript prior to submission

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Abbreviations

BMI: Body Mass Index; DOAJ: Directory of Open Access Journals; FAO: Food and Agriculture Organization; OV: Overweight; OB: Obesity; SBCC: Social Behavior Change Communication; URT: United Republic of Tanzania; WHO: World Health Organization

Figures

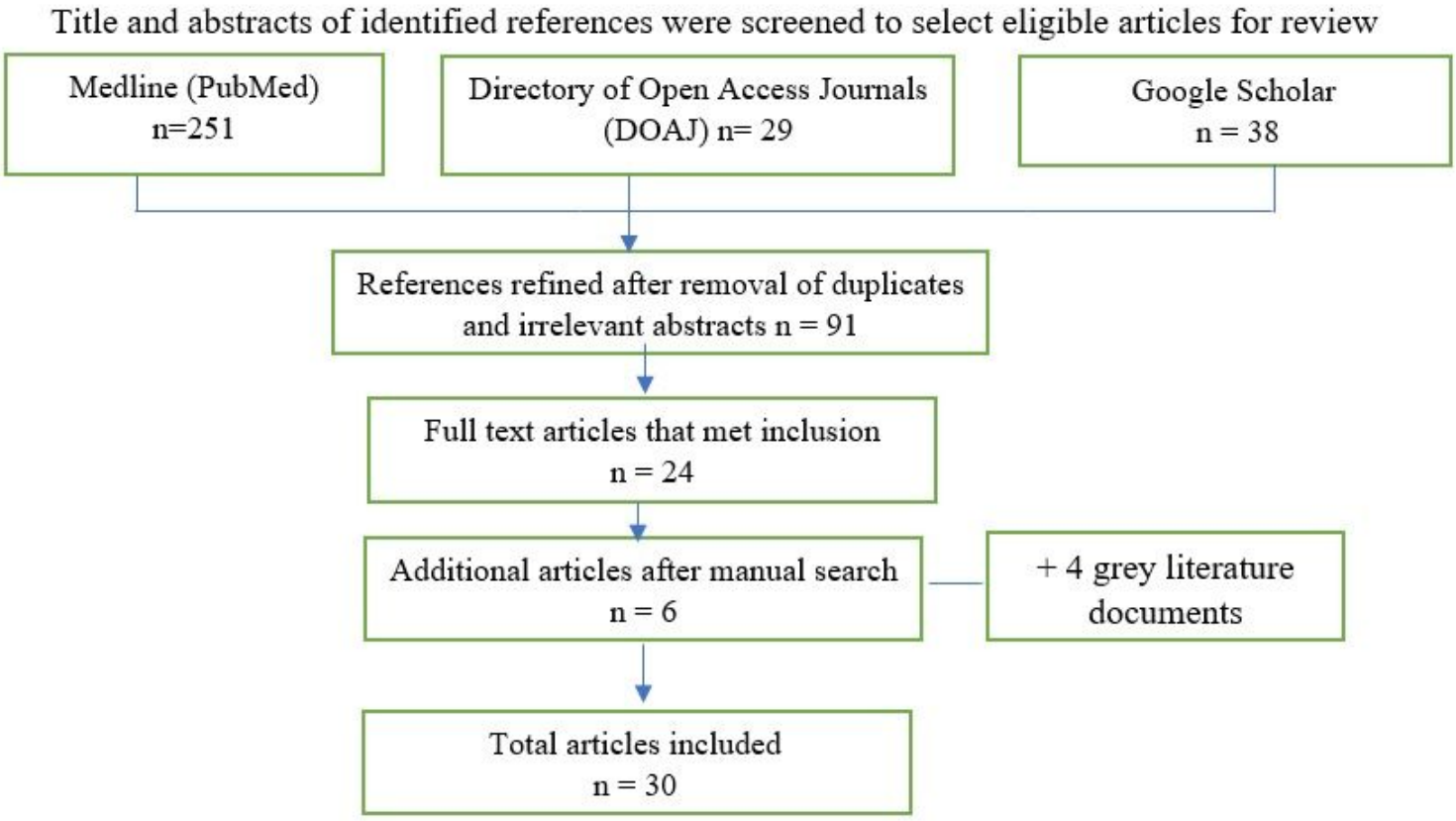

Figure 1

Flow chart for the inclusion of eligible studies