Food-based dietary guidelines in Africa and their inclusivity of plant-based dietary patterns

Food-based dietary guidelines (FBDGs) are powerful country-level policies that can guide healthy diets from sustainable food systems. They are associated with several Sustainable Development Goals (SDGs), particularly SDG 2 (zero hunger), SDG 3 (good health and well-being) and SDG 13 (climate action). However, most FBDGs still favour animal-based food consumption despite increasing global adoption of plant-based dietary patterns to meet health and climate targets. Our objectives were to review the extent of African FBDGs and to analyse their inclusivity of plant-based dietary patterns. A state-of-the-art literature review was conducted, including qualitative analysis and quantitative scoring using the Balanced Food Choice Index system. We found that 12 African countries had FBDGs, although these contained less information about plant-based dietary patterns than the global average. The most balanced guidelines were from South Africa, Namibia, Benin, Gabon and Zambia. One-quarter of FBDGs in Africa refer to the sustainability of plant-based foods or dietary patterns. However, there was a significant lack of awareness of some forms of plant-based diets, with only two FBDGs discussing vegetarian diets. Five African dietary guidelines included plant-based alternatives to meat, milk or dairy. Future African FBDGs are encouraged to be inclusive of plant-based dietary choices and balance the various health, economic, environmental and ethical aspects that play a role in people's food choices.

Significance:

- We reviewed food-based dietary guidelines (FBDGs) in Africa, finding a considerable shortfall in official recommendations for the broad spectrum of plant-based diets. Only 12 African countries have FBDGs, representing one-quarter of the Food and Agriculture Organization (FAO) member countries from Africa.
- According to our analysis, sustainability is included in one-quarter of African guidelines, because they explain the environmental benefits of plant-based foods or dietary patterns. Two guidelines discuss vegetarian diets, and five guidelines include plant-based alternatives to meat, milk or dairy.

Introduction

Food-based dietary guidelines (FBDGs) can become crucial to fostering sustainable food systems.[1] Developed by over 100 countries, these national policies offer evidence-based contextual recommendations for achieving a nutritionally complete and balanced diet at a public health level.[2] Their primary purpose is to serve as a tool in health promotion, nutrition education and policy formulation, effectively addressing concerns related to health and nutrition.[3] FBDGs may further contribute information on what constitutes sustainable dietary choices on a country level.

Sustainability in food-based dietary guidelines

A sustainable food system ensures food security and nutrition for all by offering access to affordable, culturally acceptable, equitable and safe sustainable diets.[4] These diets are nutritionally adequate, promote health and minimise environmental impacts.[4] Healthy diets from sustainable food systems are linked to a number of Sustainable Development Goals (SDGs), in particular SDG 2 (zero hunger), SDG 3 (good health and well-being) and SDG 13 (climate action).[5]

FBDG policies have significance in transforming food systems and shaping dietary patterns by including recommendations for adopting sustainable diets.[6,7] Integrating climate action into all national policies is a target of SDG 13, and recommendations[8] are to leverage FBDG policies in directing sustainable low-carbon food choices. Despite this, global analyses reveal a critical gap between current FBDGs and sustainability goals.[7]

Global food systems are a leading driver of climate change, responsible for about one-third of global greenhouse gas emissions.[8] Reducing meat consumption and avoiding scenarios of overconsumption are key components of mitigating food systems emissions.[8] Dietary patterns higher in plant-based foods and lower in animal products are consistent with the United Nations Food and Agriculture Organization (FAO) and World Health Organization (WHO)[9] guiding principles for healthy and sustainable diets, often reflected in FBDGs as a sustainable dietary principle[6,7,10].

Plant-based dietary patterns, including vegetarian and vegan, vary in the extent to which they exclude animal products.[11] A global analysis from Klapp et al.[11] examined the details of plant-based dietary recommendations in FBDGs, concluding that, out of 95 examined guidelines, fewer than half had a position on vegetarian diets, with only 45% providing recommendations on healthy plant-based alternatives to meat and dairy.[11] The same analysis also found that economic interests associated with meat production influence the inclusion of plant-based dietary concepts into countries' FBDGs.[11] Increasing access to evidence-based information on plant-based nutrition is important for FBDGs that aim to integrate sustainability, promote healthy diets and avoid micronutrient deficiencies.

State of nutrition in Africa

A small proportion of African countries have country-level FBDGs. In 2022, only seven countries had government recommendations for healthy diets in the form of an FBDG policy, and none of these FBDGs had integrated concepts

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of sustainability.[12] The development of African FBDGs will likely accelerate in future years, and context-specific recommendations for sustainable healthy diets are urgently required. There are various complex systemic factors influencing food systems and consumption patterns in Africa, and this study covers some of the indicators associated with SDG 2, SDG 3 and SDG 13 that can be addressed through balanced FBDGs.

The African continent, home to over 1.2 billion people, faces a profound nutrition crisis with rising hunger, food insecurity and undernutrition, all indicators of SDG 2.[13] The FAO and others[13] report that progress towards achieving the targets set for these issues is far off track. The number of Africans experiencing hunger has risen to over 57 million, representing a much higher proportion of the population than in other regions.[13] In 2022, 19.7% of the African population was undernourished, and 78% could not afford a healthy diet.[13]

There is a 'double burden' of malnutrition in Africa, where coexisting patterns of under- and overnutrition drive increasing rates of overweight and obesity and the risk factors for developing non-communicable diseases (NCDs).[14-16] Many NCDs are diet related, such as obesity, type 2 diabetes, cardiovascular disease and some cancers. Reducing premature deaths associated with NCDs is a target of SDG 3. Despite a lack of data on overall rates of NCDs on the African continent, it is estimated that NCD-related deaths are significant and on the rise.[17] The prevalence of obesity doubled in six African countries and tripled in five others between 1991 and 2014.[18] Diabetes is also increasing in the African region.[19] In 2013, it was projected that the number of people living with diabetes in Africa would rise from 19.8 million to 41.5 million in 2035, with countries such as South Africa, Zimbabwe and the Democratic Republic of Congo facing alarming rates.[19]

The growing burden of diet-related NCDs is explained by nutrition transitions resulting from rapid urbanisation and economic development across Africa.[13,16,19-21] For example, there is an increase in diabetes rates across the economic spectrum in Africa, from 4.4% in low-income and 5.0% in lower-middle-income countries, to 7.0% in upper-middle-income countries.[19] Urbanisation-driven dietary shifts are characteristically towards 'Western' diets high in unhealthy ultra-processed foods and animal-source foods that are high in salt, sugar and trans- and saturated fats, and away from traditional high-fibre, plant-forward dietary patterns.[20] An analysis by the FAO et al.[13] of consumption patterns in African countries across the rural–urban continuum showed that urban dietary patterns are highest in animal-source foods (44%), as a result of increasing access to income. Legumes such as pulses, nuts and seeds are more often consumed in rural areas and are likely to be dropped from urban dietary patterns.[13]

Preserving traditional plant-forward dietary patterns and avoiding shifts towards Western diets are crucial for sustainable and just food systems in Africa.[22] Africa's traditional diets are rich in legumes, indigenous vegetables and whole grains, with indigenous crops revered for their substantial nutritional value, climate-resilient qualities and cultural value.[23] Indigenous food systems are important to SDG 2, yet often overlooked and underutilised, particularly in FBDGs. There are 100 'forgotten' African plant foods outlined by the FAO[24] that could contribute to food and nutrition security on the continent. Sustainable dietary patterns should emphasise local native foods to counter nutritional deficiencies and promote food security in a changing climate.

In this review, we aimed to determine the inclusivity of plant-based dietary patterns in African FBDGs. The objectives were to (1) review the extent of African FBDGs and (2) analyse their content using the Balanced Food Choice Index (BFCI) scoring system, a tool used to index countries' FBDGs for their inclusion of basic principles promoting healthy and sustainable plant-based dietary choices.[10]

Methods

The study design was a state-of-the-art literature review[25] of African FBDG documents that included a qualitative analysis followed by quantitative scoring. The purpose of state-of-the-art reviews is to outline the development of a topic by describing where we are, how we got here, and where we are headed. A state-of-the-art review is rooted in subjective realism and the idea that knowledge is shaped by individuals and communities over time.[25] This perspective aligns with the approach that country-level FBDG documents are created based on local foods and dietary patterns.

The protocol for our review and analysis of publicly available FBDG documents was cleared by the North-West University Health Research Ethics Committee (NWU-00075-24-A1). Our team included researchers based in South Africa, Germany and Nigeria. African FBDGs were collected between January and March 2024. The FAO online repository for FBDGs[26] was used for data collection. The Google search engine was also used with the keywords "dietary guideline [country name]" for all African FAO member countries.[27] FBDGs were included if they stemmed from an African country, were the latest edition, and were published from 1995 onwards. Guidelines for specific target groups, such as children; technical support papers describing the methodology for the development of FBDGs; and other nutrition policies were excluded. There were no limitations on language. Literature published in languages other than English was translated using free software, DeepL Translator, in conjunction with consultation with native speakers.

We chose to use the 47 African FAO member countries.[27] This is fewer countries than the 55 member states making up the African Union.[28] In a previous study looking at African FBDGs, Ainuson-Quampah et al.[12] used the 47 African WHO member countries. We chose to use the FAO member countries as the FAO is a driving force behind developing FBDGs worldwide and the source of the global FBDG repository.[26]

The data extraction and analysis of the FBDG documents were guided by the BFCI scoring system. The FBDGs were collected and studied, and qualitative data were extracted according to the BFCI indicators to allocate points to their score. Points were allocated for inclusive food groups, plant food sources of nutrients, a position on vegetarian diets, recommendations for plant-based alternatives, and associated health and sustainability aspects. This system was applied in a global analysis by Klapp et al.[10] and a description of the indicators and their weighting is found in Table 1. Four blinded researchers scored the FBDG documents and discussed their results to form a consensus for each country's score. A summary of updated scores for African FBDGs using the BFCI tool between 2022 and 2024 is provided in the supplementary material.

A map of food graphics from food-based dietary guidelines in Africa and their World Bank country economic classification was created, inspired by the analysis by Kraak et al.[29] of the FBDGs of G20 member countries (Figure 1).

Table 1: Indicators and their weights in the Balanced Food Choice Index

Indicator	Coding rule	Weight
No food group that includes only meat, fish, and/or eggs	Do all food groups that include meat, fish, and/or eggs also include ≥1 plant-based foods?	18
No food group that contains only dairy	Do all food groups that include dairy foods (milk or milk products) also include ≥1 plant-based foods?	18
Plant-based food sources for critical nutrients of plant-based diets	Does the guideline mention ≥1 plant-based food as a source of protein, iron, calcium, zinc or omega-3 fatty acids?	≤15 points, 3 for each nutrient
Recommendations on how to obtain vitamin B12 without animal-based foods	Does the guideline say that diets without or low in animal-based products require B12 supplementation?	5

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Indicator	Coding rule	Weight
Plant-based meat alternatives	Does the guideline text mention/do the guideline graphics (food pyramids, plates, etc.) display ≥1 plant-based meat alternative and present it as a possible alternative?	≤6 points, 3 each for inclusion in texts and graphics
Plant-based milk alternatives	Does the guideline text mention/do the guideline graphics (food pyramids, plates, etc.) display ≥1 plant-based milk alternative and present it as a possible alternative?	≤6 points, 3 each for inclusion in texts and graphics
Plant-based dairy alternatives	Does the guideline text mention/do the guideline graphics (food pyramids, plates, etc.) display ≥1 plant-based alternative to dairy products (e.g. yoghurt and cheese) and present it as a possible alternative?	≤6 points, 3 each for inclusion in texts and graphics
Recommendations on vegetarian diets	Does the guideline mention a form of a vegetarian diet and give any nutritional guidance about it?	12
Health benefits of vegetarian diets	Does the guideline point out the preventive potential of vegetarian diets in terms of non-communicable diseases such as obesity, heart disease and type 2 diabetes?	9
Environmental sustainability benefits of vegetarian diets and/or plant-based foods	Does the guideline point out the lower resource usage and/or lower greenhouse gas emissions of vegetarian diets or plant-based foods vs animal-based diets?	5
Potential sum		100

Source: ©Klapp et al.[10] (reproduced under a CC BY-NC 4.0 licence).

Guideline: any official document or web application that provides food-based dietary guidance for people in the general population (healthy adults who are not seniors, pregnant or lactating)' food group: the guidelines' largest unit of food grouping; plant-based alternatives: products that are very similar to their respective animal-based products in terms of use.

Weight: Full points if yes; zero points if no.

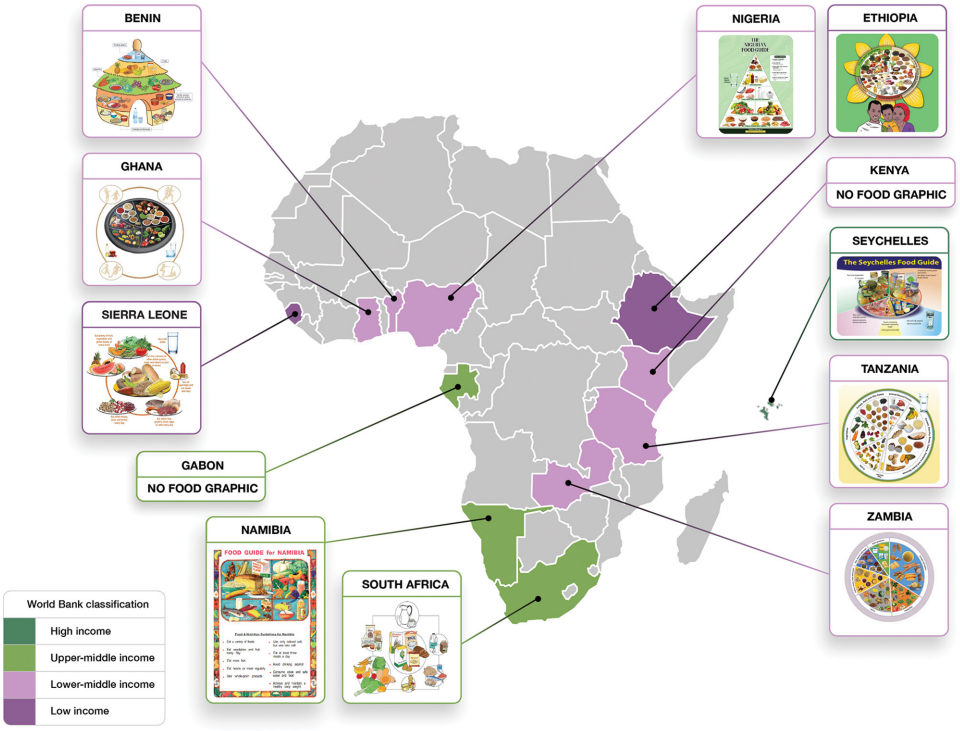

Figure 1: Food graphics of food-based dietary guidelines in Africa and their World Bank country economic classification.

A colour key was added which corresponds to The World Bank Group[30] economic classification for countries, as the literature describes associations between increasing income, increased animal product consumption and burden of NCDs.[13,19] For the 2024 fiscal year, the classification of countries was according to 2022 gross national income per capita in US dollars: $1135 or less as lower-income economies, between $1136 and $4465 as lower-middle-income economies, $4466 to $13 845 as upper-middle-income economies, and $13 846 or more as high-income economies.[31]

Table 2: Africa's food-based dietary guidelines

Country	Year	Reference
Benin	2015	32
Ethiopia	2022	33
Gabon	2021	34
Ghana	2023	35
Kenya	2017	36
Namibia	2000	37
Nigeria	2006	38
Sierra Leone	2016	39
Seychelles	2006	40
South Africa	2013	41
Zambia	2021	42
Tanzania	2023	43

Table 3: African food-based dietary guidelines and their Balanced Food Choice Index scores

Rank	Country	Score
1	South Africa	53
2	Namibia	45
3	Benin	33
3	Gabon	33
5	Zambia	32
6	Tanzania	21
7	Kenya	15
8	Ethiopia	13
9	Sierra Leone	11
10	Nigeria	3
11	Ghana	3
12	Seychelles	0

Results

Extent of dietary guidelines in Africa

Twelve African countries had FBDGs: Benin[32], Ethiopia[33], Gabon[34], Ghana[35], Kenya[36], Namibia[37], Nigeria[38], Sierra Leone[39], Seychelles[40], South Africa[41], Zambia[42] and Tanzania[43] (Table 2). These countries represent only one-quarter of FAO member countries from Africa. Figure 1 shows the food graphics of FBDGs in Africa with their World Bank economic classification. Countries' economic classification varied, but the majority (50%) of the African countries with FBDGs were lower-middle-income countries. Almost half (42%) of these guidelines were recently published, between 2020 and 2024; two were translated from French (Benin[32] and Gabon[34]).

Balanced Food Choice Index for African dietary guidelines

Balanced FBDGs are guidelines that include food choices across ethical, ecological, religious and economic aspects and, therefore, cover accurate information for the broad spectrum of plant-based diets.[10] Table 3 shows the BFCI scores for FBDGs in Africa according to our analysis and a summative table of the individual indicator scores per country is included in the supplementary material. The average BFCI score was 21.83 out of 100 points, compared with a global average of 33.58.[10]

With 53 points, South Africa had the most balanced guideline among African countries. This score was because of the mention of plant food sources of five critical nutrients (protein, iron, calcium, zinc, omega-3 fatty acids) and vitamin B12 recommendations. South Africa's guidelines had a position on vegetarian diets that highlighted several associated health benefits.[41] Points were also awarded for describing plant-based alternatives to meat, milk and other dairy products.

Namibia, Benin, Gabon and Zambia had relatively high scores. However, these countries lacked information on vitamin B12 supply in the spectrum of plant-based diets. Seychelles was in last place with zero points, indicating a considerable lack of information regarding healthy and sustainable food choices.

Factors contributing to the BFCI score are discussed in the following subsections in decreasing order of weight (as shown in Table 1).

Inclusive food groups

Inclusive food groups contribute the most points to the BFCI scoring system, and exclusive animal-product-only meat and dairy groups are allocated no points. Three countries (Benin, Namibia and Gabon) received points for inclusive meat and dairy groups, meaning that they list animal- and plant-based foods together in one food group. Namibia's FBDG recommended "eat[ing] beans or meat regularly".[37] Benin's guideline had an inclusive protein food group made up of "meat, fish, beans and other protein sources".[32]

The Tanzanian FBDG documents replaced an inclusive food group with an exclusive one. Previous Tanzanian policies grouped proteins into a "pulses, nuts and animal-source food" group.[43] In 2023, food groups were officially split into separate plant- (pulses and nuts) and animal-source foods.[43] This approach does not reflect inclusive food groups and received zero points.

Recommendations for vegetarian diets

Dietary guidelines received 12 points for providing recommendations on vegetarian diets. Among the 12 African FBDGs analysed, the word "vegetarian" only appears in those of two countries: South Africa and Zambia.[41,42]

South Africa's guidelines provided a comprehensive position on vegetarian diets, recommending a vegetarian meal at least once a week. The quoted paragraph covers many aspects of information contributing to South Africa's overall highest score:

> *People choose to follow a vegetarian diet for a variety of reasons. Well-planned vegetarian diets can be both nutritious and healthy. These have been associated with a lower risk of heart disease, type 2 diabetes, obesity and certain types of cancer, and lower blood cholesterol levels. However, restrictive or unbalanced vegetarian diets may lead to nutritional deficiencies, particularly in situations of high metabolic demand. The nutrients of major concern in a vegetarian diet are protein, iron, calcium, vitamin B12 and n-3 fatty acids.*[41]

Zambia's guidelines provided nutrient recommendations for vegetarian diets but had no comprehensive position on these diets.

> *For vegetarians and those who are not eating fish, insects and* [animal-source foods]*, … taking two servings of pulses, nuts and seeds will ensure an adequate intake of proteins and other micronutrients that fish, insects and* [animal-source foods] *provide.*[42]

Health benefits of vegetarian diets

A dietary guideline received nine points for mentioning the health benefits of vegetarian diets. As described, "vegetarian" diets were rarely referred to in African guidelines. Only South Africa's guidelines met the criterion of describing the health benefits associated with vegetarian diets, including lowered blood cholesterol and protection against NCDs such as "heart disease, type 2 diabetes, obesity and certain types of cancer"[41].

The Zambian guideline described the health benefits associated with plant-forward diets. The scoring system did not allocate points for the information found in the Zambian FBDG, because there was no reference to vegetarian diets. However, one paragraph raises awareness of the NCD-protective benefits of plant-forward diets:

> *There is increasing evidence of the health benefits of plants (grains, legumes, nuts and a variety of fruits and vegetables) on human health … Reducing the intake of red meats and processed meats like bacon, ham, sausages and burgers, and replacing these with healthier plant-based food options, insects and fish helps to reduce the risk of obesity and associated* [non-communicable diseases] *such as heart disease, diabetes and cancer.*[42]

Environmental sustainability

Three African countries met the criteria for including the sustainability benefits of vegetarian diets or plant-based foods. The Zambian FBDG demonstrated a comprehensive statement on sustainability, mentioning a range of environmental parameters such as greenhouse gas emissions, land and water requirements, deforestation and soil health:

> *Eating a diet predominantly based on whole grains, legumes, fruits and vegetables, fish and insects is not only good for our health, but it is good for planetary health too. Growing whole grains, legumes, fruit and vegetables, and producing fish and insects does not produce as much greenhouse gas as raising cattle or large livestock. Raising livestock produces 14.5 percent of all greenhouse gas emissions, with cattle (raised for both beef and milk, as well as for inedible outputs like manure and draft power) contributing 65 percent of the livestock sector's emissions. Whole grains, pulses, fruits and vegetables, insects and fish also help reduce waste and lower pollution. Such a dietary pattern also reduces water and land use, slows deforestation and reduces the destruction of topsoil, among other benefits.*[42]

Guidelines from Sierra Leone and Ethiopia received points for underscoring the role of beans, pulses and legumes in sustainable food systems and promoting protein diversification.

> [Pulses and legumes] *have important nitrogen-fixing qualities needed for enhancing soil fertility, hence they have a positive impact on the sustainable environment in the context of the changing climatic conditions.*[39]

> *Food system transformation processes that target improving diet quality must consider actions needed to increase production diversification, must include production and productivity of legume crops.*[33]

Nutrient recommendations

The literature often describes five critical nutrients that require special attention in a predominantly plant-based diet: protein, iron, calcium, zinc and omega-3 fatty acids. The BFCI awards three points for each nutrient if a guideline mentions plant-based foods that can provide these nutrients. More points are allocated for sourcing vitamin B12 (five points) recommendations for people who consume few or no animal products in the form of fortified foods and supplements.

Only two (17%) guidelines recommended sourcing vitamin B12 when animal products are excluded. Zambia's guidelines highlight the risk of vitamin B12 deficiency when omitting animal products from the diet.

> *All vitamin B12 requirements must be met from animal sources of food or from supplementation, as there is virtually no vitamin B12 in plant food sources.*[41]

> *Vitamin B12 is mainly found in fish, poultry meat and dairy products. Not consuming ASF* [animal-source foods] *can lead to vitamin B12 deficiency.*[42]

Plant proteins were found in most (83%) African dietary guidelines. The Ghanaian FBDG recognised plant-based protein as an adequate, healthy and affordable alternative to animal protein.

> *Eat a variety of beans, nuts and legume seeds every day as part of a healthy diet. Beans, nuts and legumes are an important source of protein and nutrients from plant foods. Food from this group is a particularly important substitute for animal protein, since they are cheaper than animal sources for protein and micronutrients.*[35]

Three-quarters (75%) of African guidelines covered plant-food sources of iron. Several countries expressed concerns about the absorption and bioavailability of plant-based iron. Some guidelines provided recommendations for increasing bioavailability by combining plant-based sources of iron with vitamin-C-rich fruit and vegetables.

> *Citrus fruit, e.g. grapefruits and lime are also available as well as fresh tomatoes all of which are high in vitamin C, and when eaten with foods containing iron will enhance the absorption of the iron e.g. spinach, okra, etc.… It is important to recognize that iron from animal-based foods, commonly known as heme iron are better absorbed compared to plant based iron i.e. non-heme iron.*[39]

Half (50%) of the guidelines presented plant food sources of calcium. FBDGs often position cow's milk as the superior source of calcium in a diet, which is the case in the South Africa guidelines:

> *The inclusion of milk (especially calcium and potassium) in the diet is essential in order to meet the nutrient needs of most South Africa. … Adequate calcium intake is difficult to achieve with dairy free diets, even when other nutrient recommendations are met.*[41]

However, there are many sources of calcium among plant foods, as demonstrated in the Zambian guideline:

> *If milk is not available, eat calcium-rich foods such as moringa, amaranthus, cowpeas leaves, cassava leaves, baobab fruit or leaves, tamarind leaves…*[42]

Plant food sources of zinc were found in only one-third (33%) of guidelines, and Zambia's guidelines highlighted the risks of zinc bioavailability.[42] None of the guidelines made recommendations for increasing the bioavailability of zinc from plant food.

> *Zinc is mainly found in animal protein sources such as meat, and is also more easily absorbed and used from animal protein sources than plant sources.*[42]

Plant food sources of omega-3 fatty acids were mentioned the least in African FBDGs, at 25%. Risks associated with vegetarian diets and

lower omega-3 fatty acids are mentioned in two guidelines (the South African and Zambian):

> *With regard to fatty acids, the body has the ability to convert some ALA* [alpha-linolenic acid] *into the n-3* [omega-3] *PUFAs* [polyunsaturated fatty acids]*, EPA* [eicosapentaenoic acid] *and DHA* [docosahexaenoic acid]*, yet this conversion isn't very efficient. If no fish is consumed, a supplement of DHA* [docosahexaenoic acid] *should be considered.*[41]

> *DHA* [docosahexaenoic acid] *is an essential omega-3 fat found in fatty fish. It is important for brain health and is difficult to get from plant sources.*[42]

Plant-based alternatives

The BFCI awards points for FBDGs that mention plant-based alternatives to meat, milk or dairy in the text or the food graphic.

Plant-based alternatives to cow's milk were mentioned in four African guidelines (those of Benin[32], Gabon[34], Tanzania[43] and South Africa[42]). The most common milk alternative was soya milk, mentioned in the guidelines of Benin, Gabon and South Africa. Coconut milk was recommended by Tanzania.[43] Interestingly, Gabon's guidelines suggested a range of traditional milk alternatives:

> *Alternate between skimmed dairy products (milk, yoghurt) and cow's milk substitutes (sole, white beans, soya, sesame) during the week.*[34] [translated from French]

> *Treatment* [of cow's milk allergy] *consists of total avoidance of exposure to the allergens through elimination diets, and replacing cow's milk with soy or rice milk.*[41]

> *Use of coconut milk in moderation; not more than one-third of a cup per person per day.*[43]

Plant-based meat was also mentioned in four FBDGs (Kenya[36], Benin[32], South Africa[41] and Gabon[34]). Soya and associated products, including "soya meat", tofu and tempeh, dominated these recommendations.

> *Many soy foods, such as soy beans, soy nuts, soy flour, textured soy protein and tempeh, are rich in fibre. However, isolated soy protein does not include dietary fibre.*[41]

> *Supper: Stewed matoke, soya meat, steamed amaranth, melon slice…*[36]

Discussion

We have presented a review and analysis of FBDGs in Africa. Objective one was to review the extent of FBDGs in Africa, revealing a concerningly low proportion of country-level guidelines on the continent. Only 12 out of the 47 African member countries of the FAO had FBDGs, leading to a significant gap in access to official information on what constitutes healthy diets across Africa. This should prompt urgent coordination from national governments and regional FAO groups to develop FBDGs in African countries and review outdated policies against the latest scientific evidence.

It is challenging to access up-to-date FBDG documents from countries around the world. Information on the latest documents and processes is usually limited to the country level, and it is uncertain when the FAO repository was last updated. The literature does indicate the development of newer FBDGs in African countries, with Tanzanian guidelines citing development in Zimbabwe, Rwanda, Eswatini, Gambia and Botswana.[43] FBDGs will be essential for public health and food systems transformation in Africa.

Objective two was to analyse African guidelines for their inclusivity of basic information on plant-based dietary patterns. This is relevant because many people in Africa limit animal-source foods for economic, health, environmental, religious or ethical reasons.[8,13,44] The inclusivity of plant-based dietary patterns was calculated using the BFCI scoring system.[10] The results showed that African FBDGs had less information (21.83 out of 100 points) about plant-based dietary patterns than the global average (33.58 out of 100 points), indicated by the mean BFCI scores.[10] Our results calculated the top five most balanced guidelines in Africa as those from South Africa[41], Namibia[37], Benin[32], Gabon[34] and Zambia.[42] Countries can learn from the best practice examples related to FBDG policies in Africa and the rest of the world.

The greatest opportunity for FBDGs to achieve a high BFCI score is with inclusive food groups combining animal and plant proteins, as found in Namibia[37], Benin[32] and Gabon.[34] Longer, more detailed FBDG documents are associated with higher BFCI scores.[10] Our analysis found a considerable lack of awareness of vegetarian diets in FBDGs across Africa, contributing to overall low scores. This is despite the guidelines from Ethiopia[33] and Ghana[35] describing dietary patterns as traditionally plant-forward and low in animal-source foods. Africa's local foods are found in diverse recommendations from Gabon's range of milk alternatives, "white beans, soya, sesame" (translated from French: *haricot blanc, soja, sésame*)[34], to Zambia's plant food sources of calcium, "moringa, amaranthus, cowpeas leaves, cassava leaves, baobab fruit or leaves, tamarind leaves".[42]

In terms of nutrient recommendations, the African guidelines commonly presented plant-based food options for protein and iron. This was a strength across the FBDGs in Africa. There were fewer recommendations for calcium, zinc and omega-3 fatty acids, and rarely for vitamin B12 supplementation. These are all important to address as foundational concepts of plant-based nutrition.[10,11]

Many of the African guidelines criticise the bioavailability of nutrients found in plant foods. Few discuss how to effectively increase the bioavailability of nutrients. For example, plant-based food sources of iron can be combined with vitamin-Crich fruit and vegetables as a practical strategy to prevent iron deficiencies.[45] There are also several highly bioavailable plant-based food sources of calcium, including green leafy vegetables[46], fortified plant-based milk and calcium-set tofu.[47] Food preparation methods may also play a role in effectively reducing anti-nutritional factors and supporting mineral and protein absorption from staple plant foods such as legumes and grains.[48]

Milk alternatives should be incorporated into African dietary guidelines, as an estimated 70% of the global population experiences challenges in fully digesting lactose, with higher prevalence among black and Indigenous communities as well as low- and middle-income countries.[49,10] Including milk alternatives is an important part of African guidelines, as lactose intolerance is highly prevalent in Africa, ranging between 53% and 84% in North Africa and 77% and 100% in sub-Saharan Africa[49], making it difficult for a significant part of the population to digest dairy. Analysis results show that one-third of African guidelines mention plant-based milk alternatives. There is a diversity of plant milks mentioned in guidelines: soya, sesame, bean and coconut milk. Information on coconut milk is found in the guideline of Tanzania[43], where coconut palms are indigenous.[50] Globally, guidelines generally recommend fortified soya milk[10], a common option with comparable protein to cow's milk.[51]

Our results show that more African FBDGs are incorporating aspects of sustainability, compared with a 2022 review[12] finding no sustainability aspects in African FBDGs. Zambia raised awareness of the climate impacts of animal agriculture and recommended plant-based dietary patterns in their FBDG.[42] This is in line with an FBDG analysis of the G20 countries by Kraak et al.[29], which showed that limiting meat consumption is an important part of sustainability in FBDGs, especially for higher-income contexts. Another way that African FBDGs consider sustainability is by promoting the production and consumption of legumes. Legumes are an important part of sustainable food systems, protein diversification and nutrition security.[52,53] They have a long shelf life and are an inexpensive source of protein, fibre, iron and folic acid.[54] Increased consumption of legumes can also have a protective effect against cardiovascular disease and heart attacks.[55]

FBDGs in Africa largely miss the opportunity to promote the health benefits of plant-based dietary patterns. The NCD-protective benefit of plant-based dietary patterns was only explained in the FBDGs from South Africa[41] and Zambia.[42] The rising burden of NCDs across Africa requires diverse solutions, and plant-based dietary shifts could alleviate the burden of disease and reduce healthcare costs.[56] FBDGs should be used as a platform to share evidence-based information promoting these health benefits to medical and nutrition professionals.

Conclusion

Africa needs more FBDGs to promote healthy diets from sustainable food systems. These FBDGs should be inclusive of plant-based dietary patterns and provide information for people who choose to eat plant-forward diets for health, environmental, religious or ethical reasons, or out of necessity because of food insecurity and lack of access to animal-source foods.

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Data availability

The data supporting the results of this study are available upon request to the corresponding author.

Declarations

We have no competing interests to declare. We have no AI or LLM use to declare. The protocol for a review and analysis of publicly available FBDG documents was cleared by the North-West University Health Research Ethics Committee (NWU-00075-24-A1).

Authors' contributions

N.W.: Conceptualisation, methodology, data collection, sample analysis, data analysis, data curation, writing – the original draft, writing – revisions, project leadership, project management, funding acquisition. A-L.K.: Conceptualisation, methodology, data collection, sample analysis, data analysis, data curation, writing – the original draft, writing – revisions, funding acquisition. P.N.: Data collection, sample analysis, data analysis, writing – the original draft, project management. M.U.: Data collection, sample analysis, data analysis, writing – the original draft. C.N.: Methodology, validation. All authors read and approved the final manuscript.

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