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To cite this article: EC Korir, PJ Tuitoek & D Marais (2022): Perception of proposed preliminary food-based dietary guidelines for Lake Victoria region of Kenya: findings from a qualitative study among adult community members, South African Journal of Clinical Nutrition, DOI: [10.1080/16070658.2022.2079259](https://doi.org/10.1080/16070658.2022.2079259)

To link to this article: <https://doi.org/10.1080/16070658.2022.2079259>



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Published online: 22 Jun 2022.



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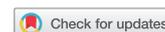
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Background: Diets in the Lake Victoria region of Kenya have been described as monotonous, consisting chiefly of starchy staple foods, accompanied by green vegetables and oil. To promote healthy eating in the region, 11 food-based dietary guidelines (FBDGs) were proposed.

Objective: This study was designed to assess perception of the proposed FBDGs amongst consumers in Lake Victoria region.

Design and setting: A qualitative, descriptive cross-sectional design was used to collect data from 36 focus-group discussions (FGD) among adult males (18) and females (18) in Kisumu and Homa Bay Counties.

Subjects: A total of 207 adult males (26–74 years) and 211 females (18–71 years) participated in this study.

Data collection and analysis: Proposed FBDGs were printed on posters and presented to FGD participants. Proceedings were audio-taped, transcribed, translated and analysed based on themes.

Results: The proposed FBDGs were perceived as promoting the consumption of a balanced diet. As a concept, a balanced diet was misrepresented as composed of only three nutrients: carbohydrates, proteins and vitamins. There was no mention of fats/oils and minerals as other significant nutrient constituents of a balanced diet. Other concepts, which included 'three regular meals', 'snacks', 'food variety', 'healthy and physically active lifestyle', were polysemous.

Conclusion: The findings provide insight to guide the adaptation of the national FBDGs. The findings also provide a basis for nutrition advocacy programmes and a rationale for the revision of nutrition education materials, including the school curriculum, to align content with current evidence-based information.

Keywords: food-based dietary guidelines, perception, healthy eating, Lake Victoria, nutrition education

Introduction

Almost half of the world's population eats low-quality diets.¹ Analysis of the diet showed that suboptimal diets were the leading global dietary risk factors for mortality in 2017.² Non-optimal intake of wholegrains, fruits and sodium accounted for more than 50% of 11 million global deaths in the year.² Generally, diets in low- and middle-income countries (LMICs), including those in sub-Saharan Africa (SSA), are characterised by high proportions of starchy foods, and are low in animal proteins, and low in fruits and vegetables.³ Persistent prevalence of underweight (24.1%),⁴ a rise in non-communicable diseases (from 18.6% in 1990 to 29.8% in 2017)⁵ in association with nutrition transition⁶ and co-occurring micronutrient malnutrition are issues of public health concern in the region.⁷

Similar to other LMICs in SSA, the population in Kenya, Lake Victoria region experiences the triple burden of malnutrition. A cross-sectional study among 384 children (aged 2 years) in Kisumu found that 23% were underweight, 30% were overweight, 90% consumed insufficient carbohydrates and 31% consumed foods rich in iron.⁸ A survey in Homa Bay found that diets in the region chiefly consisted of staple starchy foods, accompanied by green vegetables and oil.⁹ The Kenyan government's Food and Nutrition policy objective is to increase the quantity and quality of food available and accessible to ensure that all Kenyans enjoy safe food in sufficient quantity and quality throughout the life cycle.¹⁰ However, to improve

diet quality among populations most vulnerable to malnutrition within environmental targets,¹¹ individual countries have been called upon to align the national dietary goals and food-based dietary guidelines (FBDGs).¹²

The development and use of FBDGs to promote the consumption of appropriate diets and healthy lifestyles was a goal given priority consideration in the First International Conference on Nutrition (ICN).¹³ Ninety-four countries, including Kenya, have formulated FBDGs.¹⁴ The Kenyan National Guidelines for Healthy Diets and Physical Activity was launched in 2017,¹⁵ when the research reported here was under way. The proposed FBDGs were developed by a 30-member panel of policy-makers in the Health and Agriculture sectors in the Lake Victoria region to promote healthy eating among all individuals above five years of age. The guidelines were then consumer-tested for perception. This paper seeks to present qualitative findings of community members' perceptions of the proposed FBDGs.

Methodology

A qualitative, descriptive cross-sectional design was used in this study. A 30-member panel of policy-makers proposed 11 FBDGs, which were translated into 'Dhuluo', the local language (Table 1). This study was conducted to explore the community members' perceptions of the proposed guidelines. The study was conducted in the year 2017–2018.

The study sites, Kisumu and Homa Bay Counties, were purposively selected based on research findings and reports that showed a high prevalence of food insecurity, undernutrition and overnutrition in the region.^{8,9} The study area was stratified based on agro-ecological zones. The zone close to Lake Victoria is a low midland (LM) zone. The LM zone is further categorised into LM2, LM3, LM4 and LM5 zones. Agricultural potential decreases from LM2 to much lower productivity in LM5 zone. The predominant LM3 and LM4 zones were selected for this study (Figure 1). Within the selected zones, six study sites were selected using a computer random-number generator. Three focus-group discussions (FGDs) each among men (aged 26–74 years) and women (aged 18–71 years) were conducted in every stratum.

The participants were drawn from a list of village members. They to be the head of a household, be involved in food purchase and/or preparation, not coming from the same household, not relatives, not immediate neighbours and not ill. Female participants were non-pregnant and not lactating. A total of 207 adult males and 211 females participated in 36 FGDs consisting of 8–12 members. The FGDs were facilitated by a trained moderator, who had a first degree in nutrition. The moderator explained the research procedures and gave the participants time to ask questions. Only those who consented and signed the consent forms participated in the study. They could terminate their participation at any time without reprisal. The participants had their biodata recorded before the commencement of FGD sessions. The FBDGs were printed and displayed on posters, one at a time, in front of all participants, who were seated in a semi-circle. A volunteer participant read the displayed FBDGs out aloud. The participants were then asked to restate the displayed FBDGs using their own words. The FGD proceedings lasted 45 minutes. The sessions were audio-recorded, transcribed verbatim and translated into English by the moderator. Emerging themes were coded based on words used to express perceptions of the guidelines in relation to foods, nutrients, their effect on health and diet-related practices. The first author, with a trained coder, independently coded 10 transcripts and resolved discrepancies. Coding

was done with the aid of NVivo8 (Version 8, 2008; QSR International Pty Ltd, Melbourne, Australia). Descriptive statistics were used to present the biodata of the participants. This study was registered with the Kenyan National Commission for Science Technology and Innovation (NACOSTI/P/18/12634/22291).

Results

Over 65% of the participants were farmers and 19% of the males were engaged in fishing, while 14% of the female participants were housewives. Other participants managed small businesses or engaged in manual jobs (Table 2). Only 10% of the participants attained high school and tertiary education.

Promoting consumption of a balanced diet

The proposed FBDGs (Table 1) were generally perceived as promoting the consumption of a 'balanced diet' (Ksm_LM3_wom_2). A 'balanced diet' was described as the consumption of meals containing '... all nutrients' (Ksm_Urb_men_2); or a mixture of 'carbohydrate' and 'protein-containing foods and 'vegetables' (HmB_LM3_men_1); or consumption of 'energy-giving, body-building, and protective foods' (HmB_LM4_wom_1). Besides the balanced diet concept, some words and phrases, which included 'three regular meals', 'snacks', 'variety' and 'healthy physical activities', were unfamiliar.

Eat three regular meals and two healthy snacks every day

Despite engaging in fishing and subsistence farming, community members consumed less than three meals a day. This guideline was proposed to promote the regular consumption of meals and snacks. However, the participants did not know what the 'three meals' and the 'snacks' meant. They sought clarification before meaningful discussions could ensue:

'Three main meals? ... we will only understand if you explain further.' (HmB_LM4_wom_3)

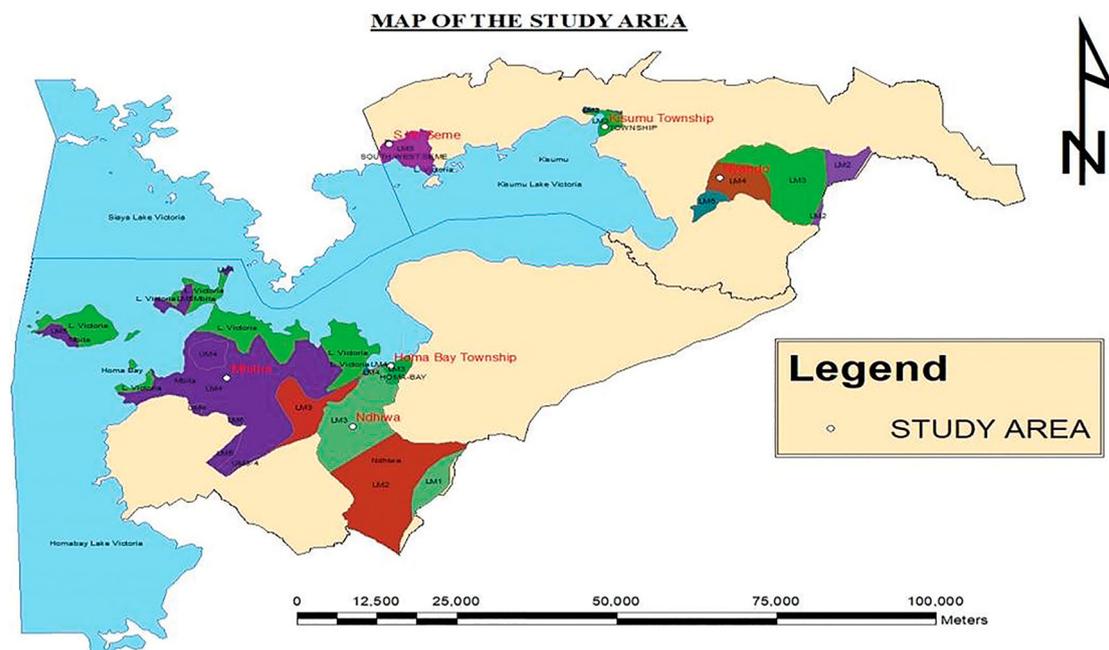


Figure 1: Map of the study area.

Table 1: Proposed preliminary FBDGs for the Lowlands of Lake Victoria Region

Proposed FBDGs message statements	'Dholuo' translated FBDGs message statements
Eat 3 regular meals and 2 healthy snacks every day	<i>Cham chiemo moko ariyo mayot e kind chiemo madongo adek gi</i>
Eat a well-constituted breakfast every morning	<i>Cham chiemo mosangi maber okinyi pile pile</i>
Every mealtime, serve on your meal plate a variety of relishes made from fish, meats, legumes and vegetables	<i>Secheduto michiemo neniiketo kabind chiemo mopogore opogore kaka ring'o, rech, kothe koda lote.</i>
Eat whole cereal grains and starches to include 'ugali' from maize/sorghum/millet, cassava, matoke, rice, and brown chapati as accompaniments to your relishes	<i>Cham chiemo mamedoteko kaka kuon arega mar cham kaka duma/bel/kal/omuogo/bel/ Chapat marabuor gi Michele.</i>
Eat meals prepared in small amounts of cooking oil	<i>Cham chemo motedi gi moo matin mar salad</i>
Eat a variety of well-washed fruits every day	<i>Cham olembe mopogore opogore moluok maler pile pile.</i>
Drink a glass of fresh milk, 'mala' (fermented), or yoghurt every day	<i>Madho glass achiel mar Chak machiew mopoto kata, yoghurt odiechieng koodiechieng</i>
Drink plenty of clean and safe water every day	<i>Modhpii maler mothiedhi pile pile water every day</i>
Use clean and safe water to wash your hands and prepare food every time	<i>Ti kodpii maler mothiedhi etedokod luokoluedo kindeduto</i>
Enjoy a healthy and physically active life every day	<i>Bed gingimamakare kitimogik mijingo'o</i>
Eat less locally vended starchy, fatty and sugar-sweetened foods	<i>Kikithor chamo chiemo mihono machiwo tekomotu mosukari mangeny kata dhout chiemo mitedo gi moo mangeny</i>

'We have 'ugali' (thick porridge), fish and vegetables, are those not three major meals?' (HmB_LM4_wom_2)

'What are these snacks?' (Ksm_LM3_wom_2)

'... after eating 'ugali' you can eat a fruit, that is a snack.' (HmB_LM4_men_1)

'... there is a time I used to travel a lot, I could hear the passengers tell the driver to stopover convenience stores to buy snacks.' (HmB_Urb_men_2)

Eat a well-constituted breakfast every morning

Sugar-sweetened tea (with milk) was considered the 'main' item in a breakfast meal while 'bread' and 'eggs' were viewed as 'ideal' 'escort' (an accompaniment) for the tea. The high price of sugar contributed to skipping breakfast:

'I should take tea and an escort.' (Ksm_LM4_men_1)

'... tea (with milk) with bread every morning can be really good.' (HmB_LM3_Men_2)

'It would be good if I take some tea with enough milk and eggs in the morning.' (HmB_Urb_Men_1)

'... due to the increase in the price of sugar, we do not prepare tea, instead we prepare 'ugali' at lunchtime.' (Ksm_LM4_men_1)

The exchange of 'tea' for 'porridge' or 'boiled' instead of 'roasted maize' was viewed as introducing variety to a breakfast meal:

'... diet should not be the same food every day, if you drink porridge today, the next day you can take tea.' (Ksm_LM3_wom_2)

'... someone can take tea with roasted or boiled maize so that they do not just eat one type of food but eat variety.' (HmB_Urb_men_3)

Every mealtime, serve on your meal plate a variety of relishes made from fish, meats, legumes and vegetables

Serving vegetables alongside rice, chapati, legumes and meats was perceived as inappropriate, while the discussions on the meats and meat alternatives seemed to imply that fish, beef and legumes could 'replace' each other instead of their consumption as 'exchanges', with reference made to the school curriculum:

'... rice or chapati is a special food, we cannot mix with vegetables.' (Ksm_LM4_men_2)

'... legumes are usually accompanied with rice or chapati, how can you also take vegetables?' (Ksm_Urb_men_1)

Table 2: Demography of the research participants

FGD participants	Adult male (n = 207)	Adult female (n = 211)	Total (N = 418)
Age (years)	26–74 (34.4 ± 9.4)	18–71 (38.8 ± 8.3)	
Occupation:			
Employed	3 (1.4%)	5 (2.4%)	8 (1.9%)
Farmers	141 (68%)	132 (62%)	273 (65.3%)
Self-employed	12 (5.7%)	43 (20.4%)	55 (13.2%)
Fishermen	37 (17.9%)	–	–
Fishermen/farmers	8 (1.9%)	–	–
Manual labourers	6 (2.9)	17 (8%)	23 (5.5%)
Housewives	–	14 (6.6%)	–
Level of education:			
Primary	165 (79.7)	177 (83.9%)	342 (81.8%)
High school	26 (12.6)	16 (7.6%)	42 (10%)
Tertiary	6 (2.9%)	3 (1.4%)	9 (2.1%)

'... when you mix vegetables with food like meat or fish it dirties the soup.' (Ksm_LM4_wom_1)

'... fish and meat are the same when you eat meat (beef) and another person eats fish you will have eaten the same thing.' (HmB_LM4_wom_3)

'... in Home Science (a unit subject taught in school) ... it is like taking meat, fish, legumes and putting on one plate ... I will have done zero work to my body. It is like serving foods giving the same nutrients.' (HmB_LM4_wom_1)

Eat whole cereal grains and starches to include 'ugali' from maize/sorghum/millet, cassava, matoke, rice and brown chapati as accompaniments to your relishes

The listed foods were rightly identified as 'energy foods'. The words 'whole cereal grains' were translated to mean 'locally milled cereal flour'. The locally milled flour was described as 'heavy', with 'higher satiety', 'more energy', 'natural' with no 'chemicals':

'The locally milled flour is heavy, ... you feel full even when you go to work.' (Ksm_LM4_men_1)

'... the 'ugali' made from sorghum gives more energy.' (HmB_Urb_wom_1)

'... locally milled maize is whole, ... even bananas and cassava are natural ... they do not have any chemicals.' (Ksm_Urb_men_2)

Although traditional foods were perceived as important in the prevention of emerging diseases, their consumption was viewed mainly as therapeutic for diabetic patients:

'... the current diseases, like diabetes, requires that we eat energy giving foods like bananas and maize flour mixed with cassava or sorghum to prevent these diseases.' (Ksm_Urb_wom_2_43yrs)

'Those with diabetes mostly eat brown foods like sorghum and millet.' (Ksm_Urb_wom_2).

Eat meals prepared in small amounts of cooking oil

The use of oil was perceived as 'healthier' (Ksm_LM3_men_1) compared with fat in a layman's physiopathology:

'... fat solidifies and sticks on cold food ... it behaves in the same way in our body once we eat the food.' (HmB_LM3_wom_3)

'... the effects can block the blood vessels.' (Ksm_LM3_men_1)

Eat a variety of well-washed fruits every day

The inclusion of fruits was viewed as essential to 'complete a meal'. However, the 'well washed' component of this guideline shifted the focus to the safety concerns of unwashed fruits:

'I will take ugali, fish and vegetables, then some oranges ... when I eat such foods, the meal is complete.' (HmB_Urb_Wom_1)

'We should try and eat different types of fruits but most importantly they have to be washed with clean water.' (Ksm_LM4_Men_2)

Drink a glass of fresh milk, 'mala' (fermented milk) or yoghurt every day

To differentiate fresh from fermented milk, the 'Dholuo' translation used the word 'machiew'. Across the strata, this was misinterpreted to mean non-boiled milk:

'It is not very good to drink fresh milk because when directly from the cow it can contain a lot of dirt.' (Ksm_LM4_Men_1)

Drink plenty of clean and safe water throughout the day

The sensation of 'thirst' seemed to be the main regulator of water intake. However, the water treatment chemical supplied at some water points was not used for fear of perceived harm:

'I do not drink water unless I feel thirsty' (HmB_LM3_wom_3)

'... there is water treatment chemical at water points but people do not want, those kinds of treatments just cause harm.' (HmB_LM3_wom_3)

Use clean and safe water to wash your hands and prepare food every time

Most participants did not find it necessary to treat water for hand washing or water used in food preparation:

'Treated water is for drinking, water for food preparation boils as we cook, we do not treat water for hand washing.' (HmB_LM4_men_3)

'... wash your hands with soap, and all the germs will be removed.' (Ksm_LM3_wom_2)

Enjoy a healthy and physically active life every day

As the preceding guidelines focused on foods, the participants found it difficult to link this concept of physical activities with the issues discussed earlier. The perception of the word 'healthy' as presented on the guideline was polysemous. In their perspective, a person had to be in 'good health' to engage in physical activities:

'... after we have practised all the messages from number one, then the body will be healthy and you will feel fine and physically active.' (Ksm_LM4_wom_1)

'If I am not sick, then I have a healthy life because I do my chores.' (Ksm_LM3_wom_1)

There was a need to clarify this guideline before any meaningful discussions could proceed. Voluntary engagement in the physical activities was only acceptable in urban settings among the males and across gender in affluent communities:

'Our husbands go for jogging early in the morning.' (Ksm_Urb_wom_2)

'... if you go to "Milimani" [upmarket residence in Kisumu] in the morning, you will see the whites [foreigners] jogging, both the old men and women.' (Ksm_Urb_men_2)

Box 1: Revised Food-Based Dietary Guidelines for Lowlands of Lake Victoria

1. Eat lunch, supper and 2 healthy snacks every day.
2. Eat a well-balanced breakfast every morning.
3. Eat diverse energy-giving foods including: non-processed locally milled maize, sorghum, millet and wheat products, cassava, yarrow roots, yams, sweet potatoes, green bananas, and rice, interchangeably.
4. Eat legumes, nuts, fish, poultry, insects, meats, or eggs interchangeably every mealtime.
5. Eat plenty of diverse vegetables every mealtime.
6. Eat a variety of fruits every day.
7. Eat foods prepared with small amounts of cooking oil always.
8. Drink at least one cup of boiled fresh or locally fermented milk or yoghurt every day.
9. Drink plenty of clean and safe water throughout the day.
10. Use clean and safe water to wash your hands and prepare food every time.
11. Eat fewer fatty, salty, sugar-sweetened food products.
12. Engage in physical activities every day.

'... if I go jogging will I not be wasting time that I should be using on my farm?' (Ksm_LM4_men_2)

"... they will think you are mad or a witch, you will be "divorced".'" (Ksm_LM4_wom_1)

Eat less locally vended starchy, fatty and sugar-sweetened foods

The discussions on this guideline centred on the need to moderate the use of 'sugar' and 'oil'. The component 'starchy food' was overlooked. The word 'vended' shifted the discussions from food constituents to safety aspects. Further, although the need to moderate salt was an omission, the participants were aware of the need to moderate its intake:

'This message is discouraging us from eating food with a lot of sugar or a lot of oil.' (Ksm_LM3_wom_1)

'... vended food can expose us to the risk of cholera.' (Ksm_Urb_men_1)

Box 2: Kenyan National Guidelines for Healthy Diets and Physical Activity

1. Eat a variety of foods from different food groups every day. Include whole or unprocessed starchy foods as part of meals.
2. Eat lean meat, fish and seafood, poultry, insects or eggs at least twice a week.
3. Eat beans, peas, lentils, cowpeas, pigeon peas, soya, nuts and edible seeds regularly (at least four times a week).
4. Eat plenty of green leafy vegetables, red and yellow vegetables and fruits every day; and include a variety of other vegetables and fruit.
5. Use oil or fat in moderation in meals; limit the amount of solid fat. Use fortified oil.
6. Drink fresh milk, fermented milk or yoghurt every day.
7. Drink plenty of safe water.
8. Wash hands with clean water and soap or ashes before, during and after preparing food or eating and after visiting the toilet.
9. If you use sugar, use it sparingly.
10. Use iodised salt, but use it sparingly.
11. Engage in physical activity.

'... you can only be sure of the quality of food you have prepared at home.' (Ksm_Urb_men_2)

'... a lot of salt can cause harm to your body.' (HmB_Urb_men_2)

The study findings were used to revise the proposed guidelines (Box 1).

Discussions

Although the proposed guidelines were developed before the launch of the Kenyan National Guidelines¹⁵ (Box 2), the issues addressed by both guidelines align. Both the guidelines categorise foods into five groups: starchy foods, vegetables and fruits, legumes and nuts, meat, and dairy products. However, the Kenyan Guidelines combined fruits and vegetables in one group, but separated legumes and nuts from the meats and meat alternatives group. The proposed guidelines separated fruits and vegetables, but combined legumes and nuts with meats and meat alternatives in one group. Further, breakfast and lunch meals were regularly skipped in the Lake Victoria region. Therefore, additional guidelines to promote regular and appropriate meals were proposed. Due to inequalities in food systems, dietary patterns and the need to align national dietary goals with sustainable healthy diets boundaries, the high-income countries are called upon to reduce food intake while LMICs including Kenya will need to increase the total daily food intake (g/day) up to 20% and an increase in daily consumption of fruits, vegetables, nuts and legumes.¹⁶

Although most participants perceived the guidelines as encouraging the consumption of a 'balanced diet', some concepts of the guidelines were unfamiliar. A study in Nepal also found that participants described healthy eating in terms of a 'balanced diet'.¹⁷ However, the 'balanced diet' concept in the region was understood to mean the consumption of meals consisting of three nutrients: carbohydrates, proteins and vitamin. Similarly, a study in western Kenya (Vihiga) described a 'balanced diet' as 'a good meal consisting of foods rich in the three nutrients eaten daily on one plate namely "ugali", fish/beef, vegetable and fruits'.¹⁸ There were no references to minerals and fats/oils as significant nutrients in regular diets. Similarly, the translation of the term 'variety' to 'a menu plan' showed limited nutrition knowledge of this dietary principle. The exchange of boiled maize and roasted maize was viewed as introducing variety to a meal, while the consumption of fish, other meats and legumes was viewed as replication of nutrients. Nutrition knowledge as it existed in the community was linked to the school curriculum structure. Findings suggest the need to revise nutrition education materials to incorporate evidence-based dietary principles in meal planning.

Concepts that included 'three regular meals', 'snacks', 'healthy and physically active life' needed to be clarified before any meaningful discussions could ensue. Although fruits were perceived as necessary to make a meal 'complete', the 'well-washed' component of the guideline 'Eat a variety of well-washed fruits every day' shifted the focus of the discussions from the need to consume fruits daily, to safety issues arising from the consumption of unwashed fruits. Similarly, the discussion of the guideline 'Eat less of locally vended starchy, fatty and sugar-sweetened foods' focused on the need to moderate oil and the sugar components of the guideline, but not the starchy component. The word 'vended' diverted the discussion from the need to moderate consumption of the energy-dense

foods to a focus on the safety concerns arising from the 'vended foods' as opposed to home-cooked foods.¹⁷ There is a need to develop nutrition education materials to communicate the FBDGs to the community. The translation of the words 'fresh milk' to 'machiew', which was perceived as the use of 'non-boiled' milk, suggests the need to pre-test nutrition materials – even those translated to the local language – to ensure that the messages released to the public are perceived as intended and congruent with other health policies.

The 'whole cereal grains', translated to mean 'locally milled flour' was described as 'heavy', having 'more energy' with enhanced 'satiety'. The high fibre content in the locally milled flour is likely to increase bulk in meals, delay digestion, give a feeling of fullness for a longer time and thus delay the onset of hunger pangs. Alongside the locally milled flour, traditional foods such as cassava and bananas were described as 'natural', 'harvested directly from the farm' 'without chemicals'. Similarly, the use of water treatment chemicals was associated with harm. The 'naturalness' characteristic of food has been noted as important in people's perceptions of healthy eating.¹⁹ Although the participants linked the dietary shifts to emerging diseases including diabetes, the consumption of traditional foods was viewed as a diabetic diet and not a healthy eating choice. It may be necessary to incorporate simple explanations of benefits accrued from adherence to the FBDGs when developing educational materials for the community.

Conclusions

The proposed FBDGs were generally perceived as encouraging the consumption of a balanced diet. The balanced diet concept was misconceived as representing only three nutrients, carbohydrates, proteins and vitamins. Some concepts presented by the guidelines which included, 'three regular meals', 'snacks', 'variety' and 'healthy physical activities' needed clarification before meaningful discussions could ensue. Although the proposed guidelines compare well with the Kenyan National Guidelines, the proposed guidelines address other issues that are specific to the community. The study provides useful information to guide the adaptation of the national FBDGs, advocacy programmes and a rationale to revise nutrition education materials, including the school curriculum, to align content with evidence-based information.

Disclosure statement – No potential conflict of interest was reported by the authors.

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