

Snacking Recommendations Worldwide: A Scoping Review

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ABSTRACT

Across the globe, dietary habits include the consumption of foods and drinks between main meals. Although often described as “snacks” or “snacking,” there is no scientific consensus of what constitutes a snack, either as an eating occasion or as a snack food. Nonetheless, food-based dietary guidelines, compiled at national or regional levels by governments, learned societies, and health organizations, frequently refer to snacking habits and desirable or undesirable snack food choices. This review aims to provide a comprehensive snapshot of snacking recommendations worldwide. From a search of 207 countries and organizations, 49 countries and 7 regional or global organizations were identified that referred to snacks, snack foods, or snacking. A total of 136 snacking-specific recommendations or examples were identified, which varied in nature whereby some provided advice on the quality of the snack food choice and others focused on the frequency or energy and nutrient composition of such snacks. Guidelines varied in terms of the detail of foods and drinks identified, wherein some recommendations focused only on foods or food categories to include (e.g., fruit or dairy) or to exclude (e.g., processed foods), whereas other recommendations made reference to both. Both individual foods (e.g., apples) and food categories (e.g., fruit) were mentioned. Reasons or rationales to support the snacking choices were less frequently identified and varied across regions. It is hoped that this analysis will stimulate discussion on the need for a consensus in the scientific community and beyond with regard to snacking. An agreed-upon definition of snacks, snacking, and snack foods could be used to inform a number of stakeholders and ultimately help consumers adhere to healthful diets as defined locally. *Adv Nutr* 2018;9:86–98.

Keywords: snacks, snack foods, snacking, dietary guidelines, dietary recommendations

Introduction

Analyses of national diet and nutrition surveys provide concrete evidence that all population groups regularly eat between meals (1–8). Such eating patterns are sometimes described as “snacks” or “snacking” (i.e., eating a snack) (9). To date, a number of studies have analyzed whether a relation exists between snack foods or the act of snacking on subsequent food and nutrient intakes (8, 10–15), energy balance and adiposity (11, 16–19), or cardiometabolic health (20–22). Despite rigorous analyses, it is still unclear whether snacking has a positive or negative impact on nutrition and health outcomes, leading to the inability to reach a consensus on the relation between snacking and health (9, 23). This is perhaps unsurprising given the lack of an agreed-upon scientific definition on what constitutes a meal, a snack, or an eating

occasion for either children or adults (9, 16, 24). For snacks and snacking, a number of definitions have been used in the literature. These can be both objective or subjective in nature and can include criteria such as time, energy content, type of food, and location of consumption, or can be based on participant- or researcher-led classifications (1, 2, 6, 16, 24–29). The interpretation of the terms “snacks” and “snacking” by the lay audience also appears to have some interindividual variation (30–32), which could influence consumer behaviors or, more importantly, the comparability of research relying on self-reported snacking data. An additional level of uncertainty exists with how scientific messages on snacking are translated into food-based dietary guidelines (FBDGs) and how these may vary by region or country. FBDGs have been described by the WHO and the FAO as the “expression of the principles of nutrition education mostly as foods” (33). Compiled by many national, regional, and global authorities, they are designed to provide science-based nutrition education and guidance to the public. To be successful, they should be easily understood, culturally appropriate, and acceptable and may therefore vary by country or region (33). An

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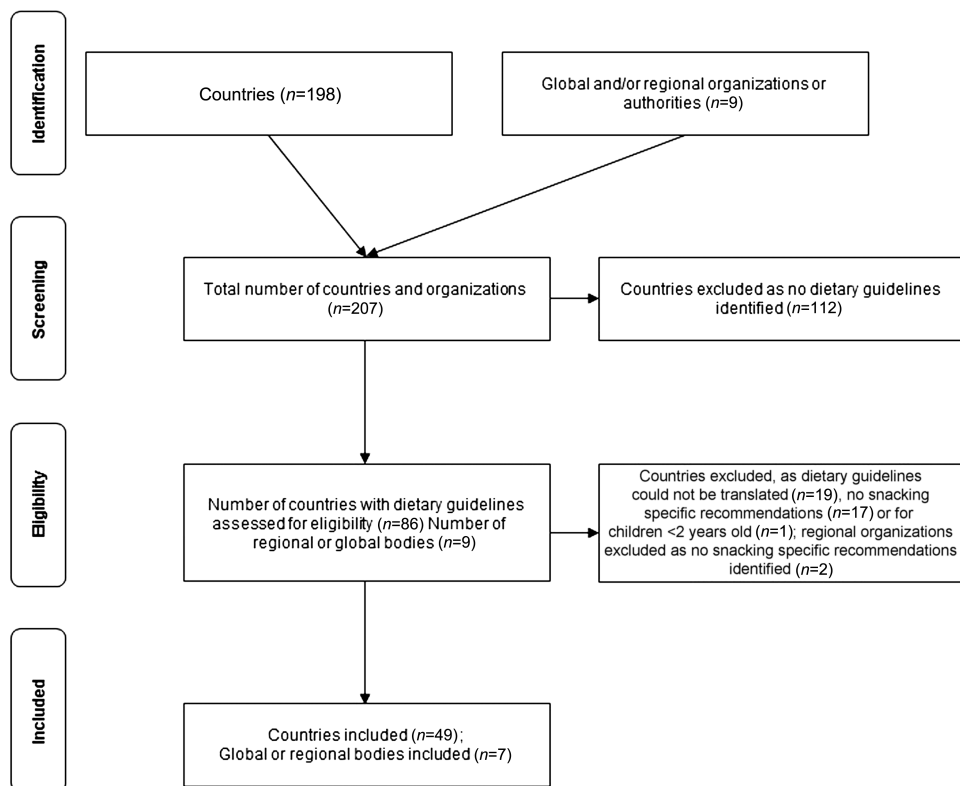


FIGURE 1 Search overview of available snacking recommendations in food-based dietary guidelines.

initial study of FBDGs of selected regions identified different degrees of focus on snacking specifically compared with other eating occasions and overall diet and also in the foods recommended as snacks (9).

This review aims to characterize the diversity of references to snacks, snack foods, and snacking in dietary recommendations around the world. It will first describe the process followed to identify snacking recommendations available worldwide, and subsequently describe the composition and variety of available snacking recommendations.

Methods

Search strategy and selection process

In the current review, a systematic search for all published FBDGs was completed to identify all available snacking recommendations. FBDGs are typically published locally in native languages and are not available in any of the usual scientific search engines. However, the FAO has compiled a repository of FBDGs globally, with links to each country's FBDG (34). This repository was the main search engine used for this review.

All population groups aged >2 y were considered. In addition, a search of national nutrition societies and, where necessary, cross-checking through personal communications was completed. The main searches were conducted between June 2015 and October 2015. All references to “snacks,” “snack foods,” “snacking,” and “in between meals” were included.

After a search of 198 countries and all regional authorities and organizations with nutrition expertise (e.g., the WHO or the European Food Safety Authority), a total of $n = 207$ countries and organizations were searched. After screening, a total of 112 countries were excluded because no dietary guidelines were identified. Dietary guidelines from the remaining 86 countries and $n = 9$ global or regional organizations or authorities (**Supplemental Table 1**) were screened for eligibility. After the eligibility check, a total of 2 regional organizations were excluded as no snacking-specific recommendations were identified and 37 countries were excluded because 1) guidelines could not be translated ($n = 19$), 2) no snacking-specific recommendations were identified ($n = 17$), or 3) recommendations were only for children aged <2 y ($n = 1$). In total, 143 recommendations for 49 countries and 7 global or regional bodies were included (**Figure 1**). All references were cross-checked for accuracy in December 2016. Translation was performed through an expert network of nutritionists who were comfortable both with the original language of the document and English. No such experts could be identified for the guidelines that were not translated.

Data extraction

Data were extracted for each country including the following: presence or absence of FBDGs, snacking recommendations, year of publication, target population group, and whether a definition of snacking was provided. Where possible, recommendations were classified as either qualitative in nature if

the wording related to the quality of the snack (e.g., “healthy” or “nutritious”) or quantitative in nature if the wording or meal-plan examples related to snack quantity (e.g., snacking frequency or calorie content). In addition, any rationale provided in support of the recommendations was recorded (e.g., limiting sugary snacks for dental health benefits). If specific food groups were recommended or discouraged in the recommendations, these were recorded and separated into 1 of 6 categories: “fruit, vegetables and juice,” “starchy foods,” “dairy,” “combinations of foods,” “other foods,” and “foods to limit” (e.g., savory snacks or confectionery). In instances in which the suggested foods involved ≥ 2 food groups (e.g., meat or cheese sandwich or breakfast cereal and milk), these were described as “combinations of foods.” Food groups outside of these categories (e.g., nuts, seeds, pulses, hummus, eggs) were classed as “other foods.”

Results

Snacking definition

Where snacking recommendations existed, only 5 countries provided a precise definition of snacking. In 4 instances, snacks were defined as foods or drinks consumed between main meals (35–38). In one instance, a caloric value (< 150 kcal) was attributed (39). For Mexico, it was also suggested that snacks were usually foods that children could consume by themselves and were convenient and easy to prepare (38).

Global and regional recommendations: numbers identified and target populations

Snacking guidance was published by the WHO, 2 WHO regional offices (Asia and Eastern Mediterranean Region), the FAO in the Caribbean, and one each by Nordic and Mediterranean groups (Table 1) (40–46). Quantitative snacking frequencies for children aged < 18 y (1–2 snacks/d) were listed by the WHO Asia Region (41) and for underweight individuals by the WHO East Mediterranean Region (5 small meals with snacks) (40). Qualitative recommendations included examples of snacks to choose, such as fruit and vegetables (fresh or dried) (40, 42, 44), whole-grain-based snacks and cereals (40), “nutritious snacks” (41), and “nutrient-dense snacks” (43, 45). Most organizations gave broad examples of snacks to limit—for example, packaged snacks (46), sugary or salty snacks (40, 42, 43, 45), or foods high in fat (43, 45). Overall, both global WHO recommendations were similar in nature, suggesting examples of snacks to limit (e.g., sugar-containing beverages and snacks) (42, 46), with greater diversity provided in the regional recommendations, which mentioned specific foods to avoid and to include (40, 45) and that were also quantitative in nature (1–2 snacks/d) (40, 41). In contrast, there were no snacking-specific FBDGs identified for the WHO European Region (47) or by the European Food Safety Authority (48). Those recommendations issued for Northern Europe (43) focused on foods to limit, whereas those issued for Southern Europe by the Mediterranean Diet Foundation focused on snacks to choose (e.g., fruit) (44).

Country-specific recommendations: numbers identified and target populations

A total of 136 examples of guidelines specific to snacking and to the consumption of snack foods were identified from 49 unique countries. More than one snacking recommendation was identified in 16 countries. The snacking recommendations from 6 of these countries came from different national bodies [e.g., in Switzerland one of the snacking recommendations came from the Swiss Nutrition Society (49) and the other came from the Federal Office of Public Health (50)]. In other cases, recommendations were issued on a state level rather than on a country level (e.g., India), which explained the multitude of recommendations. Multiple recommendations also existed in order to target different age groups (e.g., New Zealand).

To aid in interpretation, Table 2 summarizes the country-specific recommendations grouped by population age group, with supporting information available in Supplemental Tables 2 and 3. Hence, snacking recommendations were grouped depending on whether they were targeted at children (ages 2–13 y), adolescents (aged > 13 –17 y), or adults (aged ≥ 18 y). A fourth group of recommendations was not targeted at any specific population group and so was assumed to be for the “general population.” Within this, some countries ($n = 16$; e.g., the United States) had tailored recommendations for ≥ 1 population group, whereas others ($n = 14$; e.g., Oman) issued a single recommendation for the general population. By using these broad population groupings, it can be observed that most snacking recommendations were targeted at either children aged 2–13 y (64 recommendations from 25 countries) or at the general population (66 recommendations from 41 countries), with much lower numbers targeted specifically at adults aged ≥ 18 y (15 recommendations from 10 countries) or adolescents (5 recommendations from 5 countries). From the recommendations identified, Asia and the Pacific region appeared to be as active in issuing recommendations as North America and Canada, although the latter focused mainly on recommendations for children. The Middle East was the least active region, with recommendations only for the general population and adults. Broadly, equal (circa 50%) numbers of qualitative and quantitative recommendations were available for all population groups, except for adolescents for whom 75% of the available recommendations were qualitative in nature. Thirteen countries had simultaneously quantitative and qualitative snacking recommendations.

Country-specific quantitative recommendations. Quantitative recommendations (Table 2) most often related to frequency of snacking throughout the day ($\sim 85\%$ of quantitative recommendations; $n = 59$), with approximately half of these ($n = 30$) aimed specifically at children (data not shown). Quantitative guidance was not common in recommendations targeted at adolescents or adults aged ≥ 18 y. Of all the recommendations, only 2 suggested avoidance of snacks (Brazil and Namibia) (51, 52). In contrast, most ($n = 47$) quantitative recommendations suggested an

TABLE 1 Overview of snacking recommendations from global or regional authorities

Authority, year (reference)	Countries reached	Target population group	Nature of recommendation
WHO Eastern Mediterranean Region, 2012 (40)	Afghanistan, Bahrain, Djibouti, Egypt, Iraq, Islamic Republic of Iran, Jordan, Kuwait, Morocco, Occupied Palestinian Territory, Oman, Pakistan, Qatar, Saudi Arabia, Somalia, South Sudan, Sudan, Tunisia, United Arab Emirates, Yemen	All	Quantitative recommendation for underweight (5 small meals and snacks to include high-fat foods) Gives examples of foods to limit (e.g., sweetened beverages and foods, cakes, baklava, cookies, knafeh, confectionery) and snacks to choose (e.g., raw, fresh or dried fruit and vegetables, whole-grain-based snacks and cereals, plain popcorn)
WHO Asia Region, 2011 (41)	Bangladesh, Bhutan, Cambodia, Democratic People's Republic of Korea, India, Indonesia, Lao People's Democratic Republic, Maldives, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand, Timor-Leste, Vietnam	Children aged 2–18 y	Quantitative recommendation for number of daily snacks for 2–12 y olds (2/d), 12–18 y olds (1/d); qualitative recommendation for “nutritious snacks”
WHO, 2015 (42)	Global	All	Gives examples of snacks to limit (e.g., salty snack foods and sugary snacks) and snacks to choose (raw fruit and vegetables)
Nordic Council of Ministers, 2012 (43)	Denmark, Finland, Iceland, Norway, Sweden and the Faroe Islands, Greenland, Åland	All	Gives examples of foods to limit (e.g., savory snacks, foods high in fat and added sugar) for energy density and dental caries risk
Mediterranean Diet Foundation, 2016 (44)	Mediterranean regions	All	Recommends fruit, nuts, and seeds for snacks
FAO, 2007 (45)	Dominica, Grenada, St. Lucia and St. Vincent, and the Grenadines	All	Recommends reduced consumption of salty and high-fat snacks (e.g., chips and cheese curls) and choice of nutrient-dense snacks
WHO, 2003 (46)	Global	All	Links snacking/eating frequency to overweight/obesity; gives examples of foods to limit (e.g., packaged snacks and sugar-sweetened soft drinks)

TABLE 2 Overview of countries surveyed and recommendations identified for each of the population groups¹

Region	Countries with recommendations, <i>n</i>	Number of countries with		
		Qualitative recommendations	Quantitative recommendations	Rationale for recommendations
General population (no age specified)				
Asia and the Pacific	10	10	13	6
Europe	14	10	12	7
Africa and South Africa	2	1	1	2
North America and Canada	3	7	0	3
Latin America and the Caribbean	9	6	3	2
Middle East	3	2	1	1
Total	41	36	30	21
Children aged 2–13 y				
Asia and the Pacific	5	8	5	4
Europe	11	5	15	6
Africa and South Africa	4	5	1	1
North America and Canada	3	12	8	9
Latin America and the Caribbean	2	2	3	0
Middle East	0	0	0	0
Total	25	32	32	20
Adolescents aged 13–17 y				
Asia and the Pacific	1	1	0	0
Europe	2	1	1	0
Africa and South Africa	1	1	0	0
North America and Canada	1	1	0	0
Latin America and the Caribbean	0	0	0	0
Middle East	0	0	0	0
Total	5	4	1	0
Adults aged ≥ 18 y				
Asia and the Pacific	2	2	1	1
Europe	4	2	3	1
Africa and South Africa	1	2	1	0
North America and Canada	1	1	1	1
Latin America and the Caribbean	1	0	1	0
Middle East	1	1	0	0
Total	10	8	7	3
Overall total	81	80	70	44

¹ Qualitative recommendations included wording related to the quality of a snack or snack example, including names of foods or food groups from which to choose or abstain from as snacks; quantitative recommendations related to snacking frequency, energy or nutrient content, or both. The number of countries searched ($n = 198$) comprised the following: Asia and the Pacific, including Australia, New Zealand, and Oceanic Islands/Polynesia ($n = 38$); Europe, including Russia, Ukraine, Georgia, and Turkey ($n = 49$); Africa and islands ($n = 51$); Latin American and Caribbean, including Mexico ($n = 35$); the Middle East ($n = 22$); and North America and Canada, including Greenland ($n = 3$).

intake of 2–3 snacks/d (36–39, 53–76), with recommendations of 1 (53, 69, 77) and 4 snacks/d also noted (60). Less common were prescriptive guidelines suggesting suitable energy or nutrient contents or ranges per snacking occasion ($n = 13$), with slightly greater numbers targeted at the general population ($n = 8$) than for children ($n = 5$). Suggested caloric values for snacks aimed at the general population included <150 kcal/serving (39), <250 kcal/snack (78), or <300 kcal/serving (79). Where caloric ranges were provided, they suggested that energy intakes from snacks (or light meals) should be 5–15% of the daily energy intake per occasion (56, 68, 80–84), with no difference in guidance on energy for children and the general population. From these guidelines, it was observed that quantitative recommendations from countries in the European region tended to give percentage ranges for energy intake from snacks for the general population, children, or both (56, 68, 80, 83, 84), whereas those from Asia and South

American regions listed caloric values aimed at the general population (39, 78, 79). Furthermore, 2 recommendations from the European region provided specific quantitative guidance for nutrients. One of these recommendations for children specifically listed approximate values for protein, fat, and carbohydrate in grams for morning and afternoon snacks (3.25, 2.8, and 24 g and 7, 6, and 41 g for morning and afternoon, respectively) (85). For adults, one recommendation provided maximal targets for content of added sugar [<10% of energy intake (EI)], total fat (<30% EI), and saturated fat (<10% EI) (84). None of the quantitative recommendations identified focused specifically on fiber and micronutrients.

Country-specific qualitative recommendations. On examination of the qualitative recommendations ($n = 80$; Table 2, Supplemental Table 3), 4 themes emerged (Table 3). The most common theme related to recommendations

TABLE 3 Examples of the qualitative recommendations identified ($n = 80$), as grouped into themes and shown by region and age group¹

Theme	Example text	Source regions (recommendations per region, n)	Target age group [recommendations per age group, n]	Source (reference)
Healthy/nutritious	"Nutritious snacks"; "healthy snacks"	Asia and the Pacific (7) Europe (4) Africa and South Africa (4) North America and Canada (5) Latin America and the Caribbean (0) Middle East (1)	General population [9] Children [9] Adolescents [2] Adults [1]	(36, 37, 49, 52, 55, 70, 78, 79, 81, 86–97)
Nutrient/energy density	"Snacks that are high in nutrients and low in calories"; "nutrient-dense snacks"; "healthy snacks; high in essential nutrients and low in fat and/or sugar"; "ideal snacks provide energy, protein, carbohydrate, vitamins, minerals, dietary fiber and a good balance of dietary fats"	Asia and the Pacific (3) Europe (0) Africa and South Africa (0) North America and Canada (1) Latin America and the Caribbean (0) Middle East (1)	General population [2] Children [2] Adolescents [0] Adults [1]	(37, 87, 94, 98, 99)
Moderation/suitability of snack	"Equal distribution of energy intake over the day"; "suitable snacks"; "snacks should be part of a reasonable diet"; "snacks should not replace main meals"; "enjoy snacks moderately"; "alcohol contains calories and may promote snacking"	Asia and the Pacific (7) Europe (5) Africa and South Africa (2) North America and Canada (3) Latin America and the Caribbean (0) Middle East (0)	General population [6] Children [7] Adolescents [3] Adults [1]	(53–55, 80, 86, 90, 95, 99–105)
Other	"Do not choose snacks only based on the taste and preference"; "according to the needs of physical or learning activities, take snacks in the right amount between meals, but not too often every day"; "encourage kids to invent new snacks"; "whole grains can be healthy snacks: be good role models"; "rewarding with sweet desserts or snacks may encourage them to think that treats are better than other foods. Comfort and reward with care and praise not food"	Asia and the Pacific (3) Europe (0) Africa and South Africa (0) North America and Canada (3) Latin America and the Caribbean (0) Middle East (0)	General population [1] Children [4] Adolescents [1] Adults [0]	(55, 89, 95, 106)

¹ Single reference sources may have contained ≥ 1 recommendation; hence, numbers of recommendations and references do not tally.

mentioning the words “healthy” or “nutritious” ($n = 21$) (36, 37, 49, 52, 55, 70, 78, 79, 81, 86–97), which was further expanded in a second theme where the words “nutrient density” or “energy density” were used ($n = 5$) (37, 87, 94, 98, 99). Recommendations in a third recurring theme ($n = 17$) related to snacking suitability or moderation, including snacks being “part of a reasonable diet” (54, 55, 86, 90, 100) or complementing, rather than replacing, meals (53, 55, 80, 95, 99, 101–104). A fourth theme ($n = 6$) was described as “other” because it contained a variety of qualitative recommendations, including avoiding snacks on the basis of taste and preference (55), acting as a role model (89), encouraging children to invent new snacks (106), and rewarding with attention not with treats (95). Food-based qualitative recommendations were often used (e.g., fruit, vegetables and juices, starchy foods, dairy foods, combinations of foods, other foods, foods to limit). Many of these food-based recommendations were not mutually exclusive and co-existed alongside quantitative recommendations or rationales for such recommendations; hence, these will be discussed in more detail later in this review.

Overall, within each qualitative theme, recommendations were more likely to arise from countries in the Asia and the Pacific region than for any other region, with 37–60% of recommendations within any individual theme from the Asian regions. Recommendations from European countries were more likely to fit within the theme suggesting moderation in snack intake and referring to suitable snacks (25% of recommendations within the “moderation/suitability of snacks” theme). Finally, most recommendations within any one theme were targeted at children and at the general population, except for recommendations within the theme “other,” which were more likely to be targeted at children (e.g., focusing on foods as rewards).

Country-specific recommendations specifically listing foods to choose or limit. As mentioned, specific foods or drinks were regularly suggested as part of qualitative or quantitative recommendations or the rationale for particular snacking habits. Given the wide breadth of foods listed in the guidelines, a record was kept of each food or food category and was described as “fruit, vegetables and juice,” “starchy foods,” “dairy,” “combinations of foods,” “other foods,” or “foods to limit.” Across recommendations (Supplemental Table 3), “fruits, vegetables and juices” were most frequently mentioned ($n = 67$), followed by “starchy foods” ($n = 29$; e.g., bread, whole grains, crackers, oatcakes, rice, yams, potatoes, pastas, plain popcorn) and “dairy products” ($n = 43$; e.g., milk, cheese, or yogurt). A further 53 acknowledged “combinations of food groups” and 40 acknowledged “other foods.” Examples of “combinations of foods” included vegetables and dip or dairy, fruit and dairy, or starch and dairy (e.g., cheese sandwich). “Other foods” included nuts or seeds, hummus, or eggs. Furthermore, 70 of all recommendations identified listed specific foods (e.g., confectionery, chocolates) or characteristics of foods to

TABLE 4 Overview of most commonly repeated snacks to promote and to limit

Snacks to promote	Snacks to limit
Vegetables (no condition)	High-sodium and/or -fat foods (e.g. salty biscuits, crisps, salted nuts)
Fruit ¹ (raw, fresh, dried)	High-sugar and/or -fat foods (e.g. biscuits, cakes, chocolate, candy bars, sugar, confectionery)
Dairy (no-fat/low-fat milk, cheese, yogurt)	High-sugar drinks ¹
Starchy foods (e.g., bread, whole grains, crackers, oatcakes, rice, yams, potatoes, pastas, plain popcorn)	Fried foods
Combinations of foods (e.g., vegetables and dip/dairy, fruit and dairy, starch and dairy)	
Nuts/seeds (unsalted)	

¹100% fruit juices were mentioned both in snacks to promote and snacks to limit.

avoid or limit (e.g., foods high in fat, sugar, salt, or saturated or *trans* fat or ultraprocessed foods). Hence, substantial variation existed between countries with respect to specific foods listed. **Table 4** provides a short summary of the most commonly repeated snacks. It is noticeable that substantial variability also existed within countries, depending on the organizations that commissioned the recommendations. For instance, in Brazil, 2 recommendations that targeted children were identified: one recommends fruit, vegetables, and juice, whereas the second did not and focuses instead on “foods to limit” (51, 76). The same pattern was seen in other countries with guidelines focusing more on foods to limit or foods to promote. Variability also existed between guidelines for different age groups [e.g., in New Zealand, the Ministry of Health provided guidelines to children and young people (99), older people (87), and healthy adults (97)]. Despite differences in how the messages were worded and presented, antagonistic statements in the guidelines were not a common finding, even when they were issued from different governing bodies.

Rationales for global, regional, and country-specific recommendations

In total, 50 unique recommendations provided ≥ 1 rationale for the snacking guidance, with 44 from national organizations (Table 2) and 6 from global or regional organizations. **Figure 2** provides a summary of the diversity of rationales suggested, for children and for the general population (with details provided in **Supplemental Table 4**). Across the globe, the most frequent rationale ($n = 19$) suggested snacking as a way to contribute to energy or nutrient intake (including fiber) for both children ($n = 8$) and the general population ($n = 11$) (36, 37, 40, 43, 52, 53, 72, 78, 82, 85, 87, 100, 102, 107), with examples of supporting text including “snacking can add vitamins, minerals and other nutrients to the diet” (78) and “snacks make a valuable contribution to energy and nutrient intake between main meals” (37). The second most-frequent rationale ($n = 11$) related to dental health, with

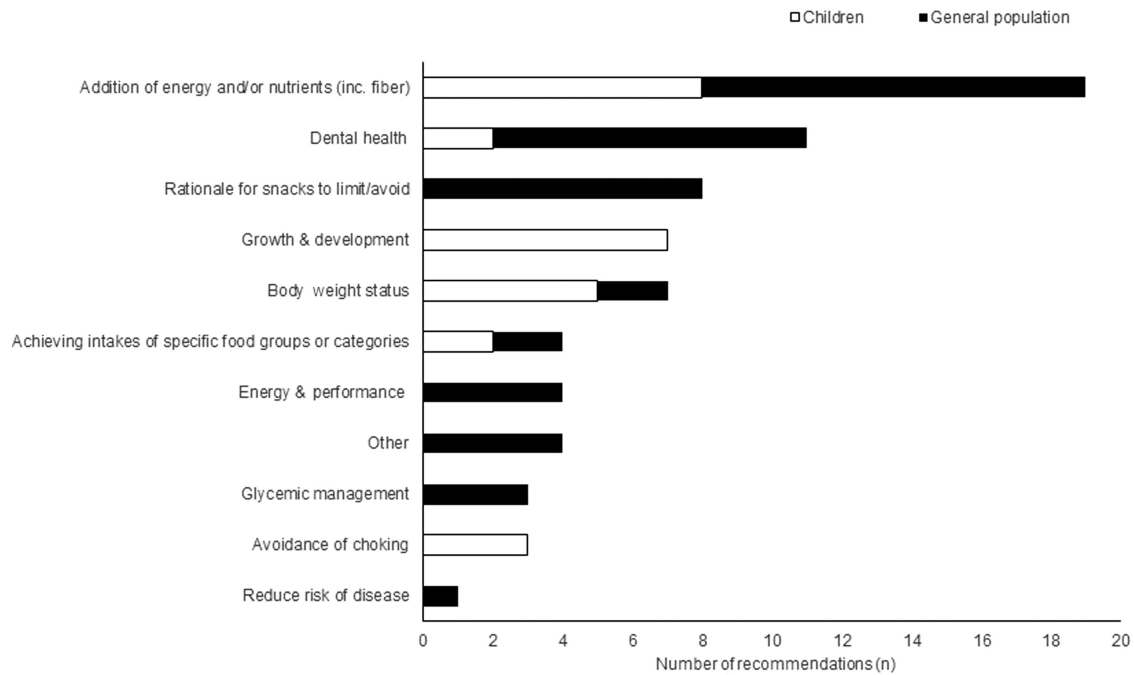


FIGURE 2 Summary schematic of the rationale provided for snacking recommendations globally by target population group, including, including.

these messages again targeted at both the general population and children—for example, “to reduce dental decay, restrict the frequency of eating foods and drinking beverages with a high sugar content” (97) and avoid sugary snacks to have “less problems with dental caries/tooth decay” (108). Although recommendations relating to growth and development ($n = 7$) and avoidance of choking ($n = 3$) were solely aimed at children, recommendations relating to reduced risk of disease ($n = 1$), improved glycemic management ($n = 3$), and rationale for foods to limit or avoid as snacks ($n = 8$) were targeted at adults. Examples of these latter rationales included “benefits of less salty snacks: good control of blood pressure, decreased risk of heart and blood vessel diseases” (108) or “because of their ingredients, ultra-processed foods—such as packaged snacks, soft drinks, and instant noodles—are nutritionally unbalanced” (51). Recommendations within the category “other” ($n = 4$) ranged from “fulfilling social needs” (78) to “respecting the body” (109).

There was some heterogeneity observed in the specific rationale of the recommendations depending on geography. For example, Caribbean countries were more likely to focus on reduced consumption of salted snacks in the context of controlling blood pressure and reducing the risk of diseases of the heart and blood vessels (108, 110–112), whereas Oman focused on salt and *trans* FAs as risk factors for hyperlipidemia (98). Furthermore, countries outside of the European and North American regions were more likely to feature body weight status—for example, “Use local fruits and vegetables for snacks instead of sugary snacks” as providing “better weight control” (St. Kitts and Nevis) (112) and Oman’s recommendations link an increase in snacking to rising rates

of overweight and obesity (98). Although global recommendations make reference to snacks in the context of overweight and obesity, regional WHO recommendations allude to the role of snacks in underweight individuals as well (40, 42, 46). Collectively, this suggests that countries and authorities have different focuses depending on the perceived role of snacking and relative value of nutrients or health states.

Finally, across the range of qualitative or quantitative recommendations and their supporting rationales identified, it was observed that specific foods were more often mentioned in association with qualitative recommendations as being “healthy” or “nutritious” or as “foods to limit” (e.g., choose healthy foods such as fruit, salads, and vegetables for snacks; don’t eat salty snacks like crisps every day) (86). In contrast, when a rationale was provided, it was more likely to also mention specific nutrients contained within the foods and their relation with health (e.g., dairy foods are a great source of calcium, which helps to build strong bones and teeth; most calcium is obtained from milk and other dairy products) (36).

Discussion

To our knowledge, this is the first comprehensive review of snacking recommendations globally. This review highlights that there is considerable variation in the nature of the recommendations and in the level of detail presented, both within and between countries and regions.

Since 1992, the FAO and WHO have promoted the use of FBDGs to improve dietary practices and reduce diet-related public health problems (33, 113). Despite their efforts to promote the proliferation of FBDGs (114), our analysis, like others, shows that a large number of countries (57% of the

countries surveyed in this analysis) do not have easily identifiable official dietary guidelines (115). Nonetheless, snacking seems to be a prominent topic, with more than half of the countries that issue guidelines ($n = 49$) having ≥ 1 or even several recommendations on the topic. Still, guidelines vary considerably on what is a snack and what its role is in the diet, if any. It is still unclear whether the variations among guidelines stem from a gap of scientific evidence or how the evidence is translated into FBDGs, or whether the guidelines require modification on the basis of country-specific public health nutrition needs (33).

In the absence of any consensus definition of what constitutes a snack (9, 23, 24), this review was structured to first identify the presence or absence of any snacking recommendations and, second, to try and understand the nature of the recommendations identified and whether they varied by population and region. By using this structure, we observed that snacking guidance was typically targeted at younger children and at the general population, with a greater presence of such guidelines in the broader Asian, European, and US regions; guidance for adolescents and in regions such as Africa, Latin America, and the Middle East was less commonly found. This adds to recent research, which reported that lower income and African countries were less likely to have guidelines (115). Of particular note was the very limited targeted guidance for adolescents, given both the increased nutritional requirements characteristic of this life stage coupled with other lifestyle factors that can influence food choice and nutrient intake (e.g., exams, sports, or fear of fatness) (116).

When the identified recommendations were classified as being related to the quality of snack foods (qualitative) or to the quantity of snack foods consumed (quantitative), it became apparent that overall broadly equal numbers of both types of recommendation existed ($\sim 50\%$), but not always in parallel. This may reflect the fact that recommendations may have different target audiences; quantitative recommendations are reported to be useful for health professionals and policy makers, whereas qualitative recommendations are useful for the public (33). However, even within the recommendation types, considerable variance was observed. For example, nearly as many qualitative recommendations were identified that were related to “healthy/nutritious” ($n = 21$) as for “snack suitability and/or moderation” ($n = 17$). Furthermore, there were also a considerable number of qualitative recommendations ($n = 11$ in total), which provided guidance ranging from nutrient or energy density to the use of foods as rewards. This may suggest that dietary guidance on snacking reflects national health priorities. It may also acknowledge the different aspects of food intake insofar as multiple factors influence food choice. However, this also results in multiple messages that could be viewed, in some instances, as positive (“gain framed”) or negative (“loss framed”) in nature (e.g., choice of healthy snacks compared with avoidance of unhealthy snacks) and, in some instances, listed concurrently (55, 86, 95). It has been suggested that “gain framed” messages are more effective with the general

population, whereas “loss framed” messages are more likely to succeed with health professionals (117). In the context of FBDGs, original FAO/WHO advice suggested that “dietary guidelines need to be positive and encourage enjoyment of appropriate dietary intakes” (33). Collectively, this suggests that snacking messages should be tailored to the intended audience to ensure greater responsiveness and compliance to dietary goals, with more positive “gain framed” qualitative messages more likely to succeed with the general public (117).

Within the quantitative recommendations provided, there was greater agreement as to an acceptable frequency of snack intake and suitable nutritional criteria. Where stated, most countries recommended consuming 2 snacks/d (54%), but recommendations also varied from none to 3 and 4 snacks/d. It was typically unclear whether the recommended snacking frequency was based on actual consumption patterns identified from national food consumption surveys, published studies, or expert opinion accounting for life stage, cultural norms, and working environments. Unsurprisingly, half of these recommendations were targeted at children because of their high energy requirements to support growth and development (118). However, the remainder were targeted at other life stages, suggesting that most FBDGs globally acknowledge, at least subtly, that there is a role for snacking at all ages. Where provided, suitable energy contents for snacks ranged from 150 to 300 kcal/d for adults to 5–15% of total daily energy intake for children and adults, as described earlier. Of note, this concurs with the many definitions of snacks as used in the scientific literature in which snacks have been defined as $<15\%$ of total daily energy intake (11, 119, 120) or ≥ 210 kJ (50 kcal) (26). Quantitative guidance for intakes of macronutrients (e.g., fat and saturated fat) was identified, perhaps reflecting published articles that linked energy-dense snack foods and beverages with excess intakes of these nutrients or unfavorable dietary patterns (16, 119, 121). However, scientific research on the contribution of snacks to fiber and micronutrients did not appear to be translated to specific recommendations (122–124). The potential of introducing snacks formulated to address micronutrient insufficiencies globally has previously been identified (9) and merits further consideration.

Considerable effort was made during this review to detail examples of the foods and food categories that were encouraged to include or exclude as snacks and any rationale provided. Unsurprisingly, “fruit, vegetables and juice,” “starchy foods,” and “dairy foods” were most frequently recommended; and foods high in fat, saturated fat, salt, or sugar were proposed to be restricted. There was no clear pattern with respect to the specific food examples given. Some countries and organizations listed names of specific foods to include or limit (37, 40, 50, 53, 79, 97, 108), whereas others simply mentioned broad categories (42, 43, 46, 98). Advice to choose foods “low” in sugar or salt was also common, but no quantitative benchmark was provided to define whether a food would be “high” or “low” in a particular nutrient (37, 98).

All supporting rationale statements were grouped into 1 of 11 categories, with the most frequent rationale listing the ability of snacks to contribute to energy and nutrient intake followed by the influence of snacks on dental health. This reflects published studies, which have tended to focus on the contribution of snacks to nutrient intake, energy density, and dietary quality (121–124, 125) or on the influence of dietary components on dental health (126). Greater variation was observed with respect to other rationales provided, with few recommendations providing rationales for health-related conditions such as body weight status, glycemia, and heart health. Such variation likely mirrors a lack of consensus in the literature in which snacking has been reported to have benefits for heart health (20–22) but to have a less clear relation with adiposity and body weight status (2, 3, 120, 125). It has also been suggested that any relation between snack choices and weight status may be dependent on the pre-existing health status of the individual (127). To date, there has been no systematic review of studies examining if a relation exists between snack choices and health outcomes. Such an analysis would be helpful not only for research but also to provide practical guidance to the public.

Strengths of this review include the extensive nature of the search and systematic approach to describing and cross-checking the data. It builds on previous work, which provides useful insight of snacking recommendations in English-speaking countries (9), and it is hoped that such analysis will generate discussion on the role of snacks in the diet and to provide guidance to stakeholders, ranging from health professionals to the food industry. Limitations include the reliance on identifying recommendations in English and the use of local translation where necessary. It is also possible that countries had guidelines that were not identified due to language and cultural barriers. Limitations of the approach taken to classify the identified recommendations in terms of themes and rationales are also acknowledged. However, this approach was necessary to combine the aim of the review with the volume of data generated.

In conclusion, this review provides a comprehensive snapshot of snacking recommendations worldwide. On the basis of our findings, the terms “snack” and “snacking” are used interchangeably to describe calories coming from foods or beverages consumed in-between main meals. Each of these “snacks” provides ~10% of daily energy, with a most commonly recommended frequency of 2 “snacks”/d. Although snack foods are derived from all food groups (e.g., dairy, fruit, vegetables), guidelines distinguish between snacks to limit and snacks to promote, with the former being nutrient-poor and energy-dense foods (e.g., high in SFAs, high sugar, high sodium, treats), whereas the latter focuses on nutrient density (including fiber-rich foods).

It is hoped that this analysis will stimulate further research and discussion to better understand the role of different snacking patterns and choices on diet quality. A first step toward this would be achieving a consensus definition of the terms snack, snacking, and snack foods to help align guidelines and dietary intake research. Such actions will be

helpful for the general public, health care professionals, and discussions with other stakeholders.

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