




# Exploring Enablers and Barriers of Healthy Dietary Behavior Based on the Socio-Ecological Model, a Qualitative Systematic Review

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**Background:** Dietary behavior comprises eating, preparing, or acquiring nutritious food, all of which have an impact on one's capacity to do so. A healthy diet is defined as consuming macronutrients in the right amounts to support physiologic and energetic needs without overeating, as well as enough micronutrients and fluids to satisfy those needs. This qualitative systematic review aimed to explore enablers and barriers of healthy dietary behavior based on a socio-ecological model.

**Methods:** We use a qualitative systematic review using Joanna Biggs institute methodology and conducted thematic synthesis. We have used online databases such as PubMed, MIDLINE, EMBASE, Web of Science, Google scholars, World Health Organization libraries, and African Journals used to retrieve articles. Preferred Reporting Item for Systematic Review and Meta-analysis (PRISMA) flowchart used throughout all steps.

**Results:** In this qualitative systematic review, eleven (11) articles were included. Heterogeneous study participants were involved and data collection techniques used were in-depth interviews, key informant interviews, and focused group discussion. Thematic synthesis was used since it makes it possible transparently summarise the results of previous qualitative research. Based on the socio-ecological model healthy dietary behavior enabling and barriers influencing factors are identified with five major themes: intrapersonal, interpersonal, organizational, community, and macro/policy level.

**Conclusion:** Healthy dietary behavior is influenced by numerous factors and the socio-ecological model helps to ease to address these enabling and barriers to dietary healthy behavior. Therefore, we recommend using the socio-ecological model to develop effective behavior change interventions with multilevel approaches to improve health behaviors.

**Keywords:** dietary behavior, systematic review, qualitative review, socio-ecological model

## Introduction

Nutrition is a crucial component of health, and better nutrition is linked to improved newborn, maternal, and child health, stronger immune systems, safer pregnancies and deliveries, a lower risk of non-communicable diseases including diabetes and cardiovascular disease, and longer life expectancy.<sup>1</sup> According to WHO, diet adjustments should balance calorie intake, reduce consumption of saturated and trans-fats, and increase consumption of unsaturated fats. They should also increase the consumption of fruits and vegetables and reduce the consumption of sugar and salt.<sup>2,3</sup> To promote healthy growth as well as cognitive, behavioural, and social-emotional development, adequate nutrition is a crucial factor. Inadequate nutrition in the early years of life can harm a child's development in a variety of ways and can also raise the risk of diet-related chronic illnesses, such as obesity and overweight, Type 2 diabetes, and cardiovascular disease in children, adolescents, and adults.<sup>4-6</sup> A healthy diet composed of a variety of nutrient-dense foods can help people meet their nutritional needs in the best possible ways. Prevention and control of overweight and obesity can be aided by changing eating habits beginning at a young age.<sup>7,8</sup>

Dietary behavior comprises eating, preparing, or acquiring nutritious food, all of which have an impact on one's capacity to do so. Chronic disease is brought on by eating a diet heavy in fat, salt, sugar, and sugar with little fibre and few fruits and vegetables. A healthy lifestyle that includes regular exercise, moderate alcohol use, abstinence from cigarette use, and a diet rich in fruit and vegetables and low in sugar, salt, and saturated fats can help avoid chronic diseases.<sup>9–11</sup> The WHO recommends eating at least 400 g of fruits and vegetables per day, but studies have shown that most people consume less than that amount and that they consume too many calories, salt, and saturated fat. These poor eating practices raise the incidence of chronic diseases.<sup>12–15</sup> The risk of colon, breast, and lung cancer can be reduced by eating a balanced diet, whereas bad eating habits have been linked to an increased chance of developing cancer. Individually, healthy eating practices are linked to increased nutrient intake and favourable health consequences.<sup>16–18</sup>

Diet is a key factor in determining health, and consuming fruit and vegetables has several positive impacts, including a lower chance of mortality.<sup>19</sup> According to the studies, the majority of adults do not consume the required daily amounts of fruits, vegetables, nuts, and seeds. This is because they engage in health-risk behaviors that begin in adolescence. The two main activities that may harm weight status in young adults are physical inactivity and bad eating patterns.<sup>20–23</sup> A healthy diet consumes macronutrients in the right amounts to support physiologic and energetic needs without overeating, as well as enough micronutrients and fluids to satisfy those needs. Vitamins and minerals are needed in very tiny amounts for appropriate growth, development, metabolism, and physiologic functioning, while carbohydrates, proteins, and lipids provide the energy required for the cellular processes required for daily functioning.<sup>24–26</sup>

A social-ecological approach is a comprehensive approach to the explanation of human behavior. The key concept of this approach is that behavior is multifaceted, with social and environmental issues being important contributing factors. Social-ecological models have proven to be an effective framework for understanding and guiding behavior change interventions. The socio-ecological framework is a multilevel conceptualization of health that contains five levels, intrapersonal, interpersonal, organizational, environmental, and public policy factors.<sup>27</sup> The model is helpful in our efforts to understand how people interact with their environments and is especially important in understanding behaviors with complex aetiology that must be maintained over time, such as physical activity, nutrition, sun protection, substance use, and dietary behavior. Therefore, application of SEM to this review is important in understanding of the model to develop effective multilevel approaches to improve dietary behaviours.<sup>28–32</sup> The purpose of this qualitative systematic review was to explore enablers and barriers of healthy dietary behavior based on a socio-ecological model.

## Research Question

- What are enabling and barriers to healthy dietary behavior based on the socio-ecological model?

## Methods and Materials

### Design

To explore enablers and barriers of healthy dietary behavior based on the socio-ecological model, we use qualitative study design with thematic analysis data findings through a systematic literature review. We use a methodology from Joanna Briggs Institute and conducted thematic synthesis.<sup>33,34</sup>

### Search Strategy

The PICO model for qualitative systematic literature review questions was used to frame the search.<sup>34</sup> The population (P) were healthy dietary behavior practice and phenomena of interest (I) were enablers and barriers to healthy dietary behavior practice and the contexts (co) were school, hospitals, and community settings. The population, phenomenon of interest, contextual terms, and inclusion criteria were combined using the Boolean terms “OR” within columns and “AND” between columns to include all articles published from different databases to the search date (October 15/2022). We have used online databases such as PubMed, MIDLINE, EMBASE, Web of Science, Google Scholars, World Health Organization libraries, and African Journals used to retrieve articles (Table 1).

**Table 1** The PICO Model with Inclusion and Exclusion Criteria

	Inclusion Criteria	Exclusion Criteria
Type of participants	Primary school adolescents age 10–19 years, parents of primary school children (age 6–15 years), school staff, self-identified obesity individuals, dieticians, health care professional, primary school children, diabetic patients, Women worked with preschool children feeding Third year nurse trainee	Parents with child age <6 years Primary school adolescents below grade 5
Phenomenon of interest	Enabler and barriers of healthy dietary practice based on socio-ecological model	
Context	Community settings, school, hospitals	
Type of studies	Qualitative	Quantitative, case study, systematic review, reports
Language	English	Other than English language
Time	October 15/2022	

## Data Extraction

Articles extracted from databases were exported to Endnote version nine software after removing the duplicates, all articles were exported to a Microsoft Excel spreadsheet. Studies were retrieved by using search terms from all databases and additional sources screened for inclusion criteria. Then, articles that fulfilled the inclusion criteria were undertaken full-text review for admissibility and extraction. Preferred Reporting Item for Systematic Review and Meta-analysis (PRISMA) flowchart used throughout all steps.

## Quality Appraisal

The JBI appraisal check lists for qualitative research were used to check the quality of included studies. It has 10 items methodology, research objective, data collection, data analysis, findings, locating the researchers culturally or theoretically, the influence of the researcher, representation of participants, ethical issue, and conclusion. Answers to the 10 items are categorized as yes/no/unclear/not applicable (Table 2). For this review, the critical appraisal was performed independently by two researchers, and each article was discussed until a consensus was reached. If a disagreement did occur, a third researcher requested to assist.

**Table 2** Quality Assessment Using JBI Critical Appraisal Check List

Appraisal Checklist	Articles										
	A1 <sup>34</sup>	A2 <sup>35</sup>	A3 <sup>36</sup>	A4 <sup>37</sup>	A5 <sup>38</sup>	A6 <sup>39</sup>	A7 <sup>40</sup>	A8 <sup>41</sup>	A9 <sup>42</sup>	A10 <sup>43</sup>	A11 <sup>44</sup>
Is there congruity between the stated philosophical perspective and the research methodology	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is there congruity between the research methodology and the research question or objectives?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is there congruity between the research methodology and the methods used to collect data?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is there congruity between the research methodology and the representation and analysis of data?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(Continued)

**Table 2** (Continued).

Appraisal Checklist	Articles											
	A1 <sup>34</sup>	A2 <sup>35</sup>	A3 <sup>36</sup>	A4 <sup>37</sup>	A5 <sup>38</sup>	A6 <sup>39</sup>	A7 <sup>40</sup>	A8 <sup>41</sup>	A9 <sup>42</sup>	A10 <sup>43</sup>	A11 <sup>44</sup>	
Is there congruity between the research methodology and the interpretation of results?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is there a statement locating the researcher culturally or theoretically	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Is the influence of the researcher on the research, and vice-versa, addressed	N	No	No	No	No	No	No	No	No	No	No	No
Are participants, and their voices, adequately represent	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the research ethical according to current criteria or, for recent studies, and is there evidence of ethical approval by an appropriate body	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do the conclusions drawn in the research report flow from the analysis, or interpretation, of the data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total score	9	10	10	10	10	9	10	10	9	10	10	10

**Note:** Adapted with permission from JBI Qualitative Research Checklist. Critical appraisal tools. Adelaide, JBI. Available from: <https://jbi.global/critical-appraisal-tools>.

## Result

### Search Outcome

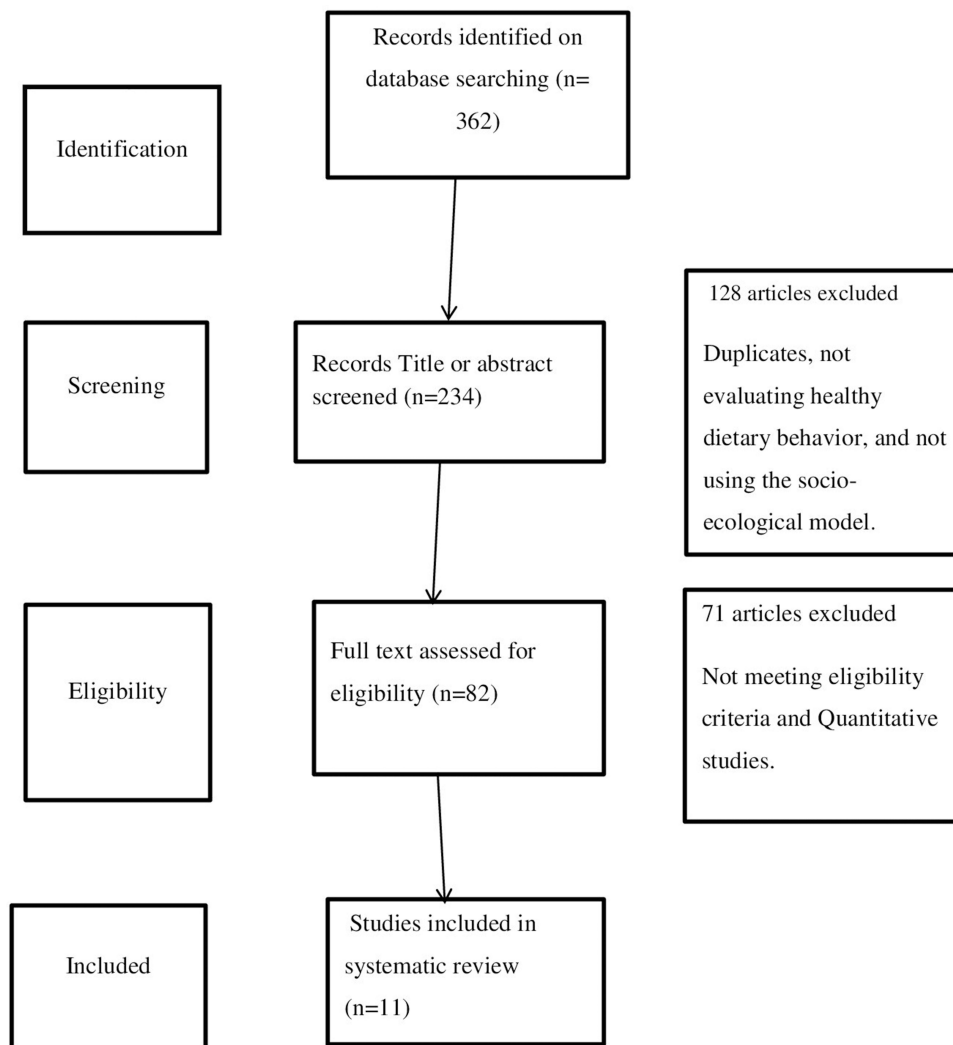
In this qualitative systematic review, 362 studies were initially identified and 128 duplicates were removed using endnote. Then two hundred thirty-four (234) articles were screened for relevance by title and abstract, yielding 82 studies. Eighty-two articles were full-text assessed by the authors and 71 studies were excluded based on the inclusion criteria. Finally, 11 qualitative studies were included in this review (Figure 1).

### Characteristics of Studies Included in This Review

This systematic review includes studies done on the enablers and barriers of healthy dietary behavior based on a socio-ecological model that is published until October 15/2022. Total of 11 articles with the qualitative study design was included in this qualitative systematic review worldwide. Heterogeneous study participants were recruited from primary school children, parents of primary school children, women working in primary school children feeding, dieticians, nurse, physicians, adolescent's age 10-19, obese individuals, diabetic patients, and nurse trainees. In this review, articles included used three forms of data collection techniques 118 in-depth interviews (IDI), 82-focused group discussions (FGD), and 26 key informant interviews (KII) (Table 3).

This review reported that food taste and preferences, unhealthy family traditions, unhealthy dietary preferences, healthy cooking being time-consuming, lack of cooking skill and knowledge, drug and Substance use, conflict stemming from childhood poverty, and food insufficiency, condemnation and lack of social support, large family size, unhealthy cultural habits, household socioeconomic status, lack of role modelling, lack of availability and accessibility of healthy food, perceived peer norms, peer and media pressure, Ineffective obesity management strategies, the social stigma of obesity on mental well-being, food Accessibility, high cost of healthy foods, poor policy implementation and regulation on food, were barriers of healthy dietary behaviour.

The study also showed that financial autonomy, self-discipline, farming practices, social support, professionals organization, media, location and access to fresh and traditional foods, health provider advice on cultural knowledge, culturally appropriate food, health promotion advertisements, training, education, and professional experience, individual capacity for motivation and change, knowledge and attitude of health eating, physical and political environment-like access to "outside" food and fast-food consumption of food in the home, availability of healthy food, government campaigns and policy, health education in schools and school policies, incentives and environmental cues in school, Financial resources were enablers factors for healthy dietary behavior.



**Figure 1** PRISMA flowchart detailing identification and selection of studies inclusion for qualitative systematic in the review.

## Thematic Analysis

Thematic synthesis was used since it makes it possible transparently summarise the results of previous qualitative research. Three phases of the synthesis were carried out line-by-line text coding, the creation of descriptive themes, and analytical themes.<sup>33,34</sup> The first stage, conducted by authors TFA, involved reading and re-reading through each article until a good level of familiarity was achieved. The result of each article was individually coded line by line. In the second stage, conducted by TFA and ETF, we looked at similarities and differences among the codes categorized into groups and develop descriptive themes. In the third stage, these descriptive themes were integrated into a set of synthesized findings that resulted in analytical themes. These analytical themes were decided upon by considering the frequency and pertinence of codes; moreover, several meetings and discussions between authors facilitated consensus on the generated themes (Table 4).

## Discussion

Food and Agricultural Organisation (FAO) and the World Health Organisation (WHO) have developed a list of 16 guiding principles related to sustainable healthy diets (SHD), targeted at governments and other stakeholders in policy-making and communication, to address the implementation of these issues.<sup>35</sup> Healthy dietary behavior is influenced by huge factors at the individual, organizational, societal, community, and policy levels that vary across the globe.<sup>36</sup>

**Table 3** Characteristics of Studies Included in This Qualitative Systematic Review

First Author, Year	Country	Study Design	Study Participants and Sample Size	Data Collection METHODS	Data Analysis	Key Findings
Kathryn Rand, 2017 <sup>34</sup>	Canada	Qualitative	19 individuals with self-identified obese and 16 Health care professionals (8 dietitians, 4 family physicians, and 4 nurses)	IDI (19) and KII (16)	Theoretical thematic analysis	Individuals living with obesity face negative mental well-being at different level <b>Individual level:</b> Food as coping mechanism and emotional distress <b>Interpersonal level:</b> two themes <ul style="list-style-type: none"> <li>● Blame and shame by family members and friends because of their weight</li> <li>● Condemnation and lack of support from healthcare professionals</li> </ul> <b>Organizational level:</b> one themes <ul style="list-style-type: none"> <li>● Ineffective obesity management strategies and the mental well-being supports needed.</li> </ul> <b>Community level:</b> one themes <ul style="list-style-type: none"> <li>● Negative impact of social stigma of obesity on mental well-being</li> </ul> <b>Policy level:</b> N/A
Roosmarijn Verstraeten, 2014 <sup>35</sup>	Ecuador	Qualitative	Adolescent (N=80), parents (N=32), school staff (n=32)	FGD (n=20)	Deductive thematic content analysis	Adolescent eating behaviour influenced by factors <b>Individual level</b> <ul style="list-style-type: none"> <li>● Financial autonomy, food safety perceptions, lack of self-control, habit strength, taste preferences and perceived peer norms</li> </ul> <b>Environmental level: three themes</b> <ul style="list-style-type: none"> <li>● Family: Parental rules, Role modelling and availability</li> <li>● School: School rules and availability</li> <li>● Outside home and school socio-cultural changes and availability</li> </ul>
Vicky Van Stappen, 2018 <sup>36</sup>	Six Europe countries	Qualitative	Parents of primary school children (age 6–12 years), teachers, local community workers	FGD (n=30) 18 FGD on parents, 6FGD teachers And 6 FGD local community workers	Deductive content analysis	Factors influencing health dietary practice are identified into 4 themes <b>Individual level</b> Unhealthy family traditions, Disliking healthy foods, Unhealthy dietary preferences, Healthy cooking being time-consuming, Lack of cooking skill and Lack of knowledge <b>Interpersonal level</b> Bad role models, lack of parental self-efficacy, Unhealthy cultural habits, reward, Availability of unhealthy foods/drinks, Wanting to render luxury and wealth <b>Organizational level</b> long distance to healthy food, unhealthy school policy and low school budget <b>Macro level</b> Negative influence of media and advertisements, Seasonal factors, Bad economic situation of the country and High cost of healthy foods
Carola Ray, 2016 <sup>37</sup>	Finland	Qualitative	Women worked with preschool children (N=14)	FGD (n=4)	Deductive content analysis	Factors influencing fruit and vegetable eating among preschool were thematic as <ul style="list-style-type: none"> <li>● <b>Individual level:</b> age, peers and child's personality</li> <li>● <b>Environmental factors (physical and social):</b> availability and accessibility of food, role model, self-efficacy</li> <li>● <b>Societal level:</b> policy of preschool and municipal</li> </ul>
Phidelia Theresa DoegahID, 2022 <sup>38</sup>	Ghana	Qualitative	Nurse trainees (age 18–25 years) (N=16)	IDI <sup>16</sup>	Thematic analysis	<b>Motivators</b> for healthy dietary behaviour <b>Individual (Intrapersonal)</b> Factors Self-discipline, Dietary knowledge <b>Social Environment:</b> Social support <b>Physical Environment:</b> Geographical access/availability <b>Barriers</b> to healthy dietary behaviour <b>Social Environment</b> Upbringing, Preferences <b>Physical Environment</b> Accessibility, Food safety <b>University Characteristics</b> Students/lectures

Derrick Ssewanyana, 2018 <sup>39</sup>	Kenya	Qualitative	Adolescents age 10–19 years (N=78), employee of community organization (4), teachers (3), clinicians (2), government staff (1)	FGD (11) and KII (10)	Thematic analysis	<b>4 major themes</b> <b>Intrapersonal:</b> Individual Preferences, Attitudes and Misconceptions, Disposable Incomes, Drug and Substance Use <b>Interpersonal</b> Household Socioeconomic Status, Parenting Practices, large family size <b>Community or institutional</b> Food Accessibility, Farming Practices, urbanization, school attendance <b>Public policy:</b> poor policy implementation and regulation on food product and hygiene
Maria Pineros-Leano, 2019 <sup>40</sup>	Latin America	Qualitative	Immigrant mothers (N=29)	IDI (n=29)	Inductive thematic analysis	Feeding decision making influenced by Five major themes <b>Culture:</b> Culture as all-encompassing <b>Country/Policy:</b> Location and access to fresh and traditional foods Disjunction between health provider advice and cultural knowledge <b>Community:</b> Location and access to fresh and traditional foods <b>Clan/ Family:</b> Responsiveness to family needs and wants as determinants of food choices <b>Individual:</b> Intrapersonal conflict stemming from childhood poverty and food insufficiency
Lizzie Caperoni, 2019 <sup>41</sup>	Nepal	Qualitative	Diabetic patients (22), health care workers (9), policy maker (2), Senior clinicians (2) researcher (3)	IDI (38)	Deductive thematic analysis	Most influential determinants of dietary behaviour organized into 3 themes <b>Individual level:</b> individual environment (Individual capacity for motivation and change) <b>Intermediate:</b> (physical and political environment like Access to 'outside' food and fast food Consumption of food in the home Availability of healthy food and junk food, Government campaigns and policy Political will) <b>Higher/broader Socio-cultural context:</b> Cultural practices (Culturally appropriate food, Ethnic dietary practices Religious dietary practices, festivals and fasting rituals), social support (Support from family (household), friends, community), Gender constructs and gender roles (Socio-culturally constructed Female/male involvement in food and cooking)
Mei Jun Chan, 2022 <sup>42</sup>	Singapore	Qualitative interpretative approach	Primary school children age 9–12 (N=48)	FGD (11)	Thematic analysis	Health eating behaviour influenced by at all level theme as <b>4 Intrapersonal influence:</b> knowledge of health eating, attitude towards health eating <b>Interpersonal:</b> parents' influences on children's accessibility to food and children's attitudes and values towards food, peer influence, teacher's influence during meal and snack times <b>Environmental influences:</b> Health education in schools and school policies, incentives and environmental cues in school, and food accessibility in neighbourhoods <b>Macro system influences:</b> health promotion Advertisements
Giovanni sogari, 2018 <sup>43</sup>	USA	Qualitative	College students age 18–25 years (35)	FGD (6)	Thematic analysis	Enabler and barriers of health diet influenced by three major themes <b>Intra personal:</b> Healthy eating: meaning, perception, and consequences Eating habits (healthy and unhealthy) Food preferences Healthy activities Food preparation and knowledge Time, price, and state of mind <b>Social level (interpersonal influence):</b> Parental feeding behaviour Diet at home, school, and eating out Friends and media Pressure <b>University environment and student life:</b> College's dining services, availability of high-calorie food and fast food
Hirsch Tad, 2016 <sup>44</sup>	USA	Qualitative	Child care providers (N=16)	IDI (16)	Thematic analysis	Five themes were identify as influencers of food choice practice <b>Individual:</b> Providers' personal characteristics, including their perceptions and values, and their training, education, and professional experience) <b>Interpersonal:</b> staff (preferences and expertise), children, parents (preferences, values, culture) <b>Institutional:</b> workplace characteristics (Financial resources) <b>Community:</b> vendors, professionals' organization, media <b>Societal:</b> culture, policy, regulation

**Table 4** Thematic Analysis of Research Finds Included in These Qualitative Systematic Review

Major Themes	Subthemes	Reference
Intrapersonal factors	<ul style="list-style-type: none"> <li>● Food as coping mechanism and emotional distress</li> <li>● Financial autonomy</li> <li>● Food safety perceptions,</li> <li>● Lack of self-control</li> <li>● Taste preferences</li> <li>● Unhealthy family traditions,</li> <li>● Disliking healthy foods,</li> <li>● Unhealthy dietary preferences,</li> <li>● Healthy cooking being time-consuming,</li> <li>● Lack of cooking skill and knowledge</li> <li>● Age, peers and child's personality</li> <li>● Self-discipline,</li> <li>● Dietary knowledge</li> <li>● Attitude</li> <li>● Perception</li> <li>● Values</li> <li>● Misconception</li> <li>● Disposable Incomes</li> <li>● Drug and Substance Use</li> <li>● Conflict stemming from childhood poverty and food insufficiency</li> <li>● Individual capacity for motivation and change</li> <li>● Knowledge and attitude of health eating</li> <li>● Healthy eating: meaning, perception, and consequences</li> <li>● Eating habits (healthy and unhealthy) food preferences</li> <li>● Training, education, and professional experience</li> </ul>	[34–44]
Interpersonal	<ul style="list-style-type: none"> <li>● Blame and shame by family members and friends because of their weight</li> <li>● Condemnation and lack of support from healthcare professionals</li> <li>● Parental feeding behaviour and rules</li> <li>● Lack of role modelling</li> <li>● Lack of availability and accessibility of healthy food</li> <li>● Perceived peer norms</li> <li>● Lack of parental self-efficacy,</li> <li>● Unhealthy cultural habits, reward,</li> <li>● Wanting to render luxury and wealth</li> <li>● Eating out of home and school friends and media Pressure</li> <li>● Social support</li> <li>● Upbringing, Preferences</li> <li>● Household Socioeconomic Status,</li> <li>● Parenting Practices,</li> <li>● Large family size</li> <li>● Responsiveness to family needs and wants as determinants of food choices</li> <li>● Parents' influences on children's accessibility to food and children's attitudes and values towards food</li> <li>● Peer and teacher's influence during meal and snack times</li> <li>● Staff (preferences and expertise),</li> <li>● Children's parents (preferences, values, culture)</li> </ul>	[34–40,42–44]
Organizational	<ul style="list-style-type: none"> <li>● Ineffective obesity management strategies and the mental well-being supports needed.</li> <li>● School rules, policy and low budget</li> <li>● Long distance to healthy food,</li> <li>● Policy of preschool and municipal</li> <li>● School attendance</li> <li>● Physical and political environment like Access to "outside" food and fast-food consumption of food in the home</li> <li>● Availability of healthy food and junk food,</li> <li>● Government campaigns and policy</li> <li>● Political will</li> <li>● Health education in schools and school policies</li> <li>● Incentives and environmental cues in school</li> <li>● College's dining services, availability of high-calorie food and fast food</li> <li>● Work place characteristics (Financial resources)</li> </ul>	[34–37,39–44]
Community	<ul style="list-style-type: none"> <li>● Negative impact of social stigma of obesity on mental well-being</li> <li>● Food Accessibility,</li> <li>● Farming Practices,</li> <li>● Urbanization,</li> <li>● Location and access to fresh and traditional foods</li> <li>● Social support (Support from family (household), friends, community)</li> <li>● Vendors</li> <li>● Professionals organization</li> <li>● Media</li> </ul>	[34,36,39–41,44]
Macro/policy	<ul style="list-style-type: none"> <li>● Socio-cultural changes and availability</li> <li>● Negative influence of media and advertisements,</li> <li>● Seasonal factors</li> <li>● Bad economic situation of the country and High cost of healthy foods</li> <li>● Poor policy implementation and regulation on food</li> <li>● Culture as all-encompassing</li> <li>● Country Policy Location and access to fresh and traditional foods disjunction between health provider advice and cultural knowledge</li> <li>● Culturally appropriate food,</li> <li>● Ethnic dietary practices</li> <li>● Religious dietary practices,</li> <li>● Festivals and fasting ritual,</li> <li>● Gender roles (Socio-culturally constructed Female/male involvement in food and cooking</li> <li>● Health promotion advertisements</li> </ul>	[35,36,39–42,44]



These qualitative systematic reviews generate evidence on the enablers and barriers of healthy dietary behavior based on a socio-ecological model perspective. Eleven<sup>11</sup> articles were included in this qualitative systematic review and two of them were done in the USA. Heterogeneous study participants were involved and data collection techniques used were in-depth interviews, key informant interviews, and focused group discussion. Based on the socio-ecological model health dietary behavior enabling and barriers influencing factors are identified with five major themes: intrapersonal, interpersonal, organizational, community, and macro/policy level.

Intrapersonal level factors identified as major themes in this review that enable and barriers to healthy dietary behavior. Age, attitude, values, perception, financial autonomy, food safety lack of self-control, food taste and preferences, unhealthy family traditions, unhealthy dietary preferences, healthy cooking being time-consuming, lack of cooking skill and knowledge, self-discipline, drug and substance use, conflict stemming from childhood poverty and food insufficiency, individual capacity for motivation and change, healthy eating (habits, meaning, perception, and consequences), education and professional experience.<sup>37-47</sup> The findings of this systematic review were supported by a review done in Europe on minority ethnic groups to identify various individual factors that were influencing healthy dietary behavior.<sup>36</sup>

Based on the socio-ecological model numerous interpersonal factors influence healthy behavior.<sup>28</sup> From this review identified interpersonal factors were condemnation and lack of social support, Parental (feeding behavior, preference, values, self-efficacy, and rules), large family size, unhealthy cultural habits, household socioeconomic status, lack of role modelling, lack of availability and accessibility of healthy food, perceived peer norms, peer and media pressure, staff preference and experience that affects healthy dietary behavior.<sup>37-40,42-47</sup> The findings are supported by a review done on pregnant women's healthy behavior influenced by money interpersonal factors.<sup>48</sup>

In this qualitative systematic review, organizational-level factors are identified as a major theme influencing healthy dietary behavior. Ineffective obesity management strategies and mental well-being support are needed, as school and municipal policy and rule, budget constraints, government policy, political will and campaigns, health education policies of the school and municipal, access to "outside home" junk and fast food consumption and workplace characteristics.<sup>37-46</sup> this factors influence individuals dietary behavior directly or indirectly.

Community-level factors are recognized as major themes in this qualitative systematic review as enablers and barriers to healthy dietary behavior. Enabling and barriers included are the negative impact of the social stigma of obesity on mental well-being, food accessibility, farming practices, urbanization, location and access to fresh and traditional foods social support (support from family (household), friends, community), vendors, professionals organization and media.<sup>38-41,43,45</sup>

This review also showed that the policy level factors were major determinant factors of dietary behavior. It includes socio-cultural changes and availability, the influence of media and advertisements, Seasonal factors, the economic situation of the country and high cost of healthy foods, poor policy implementation and regulation on food, location and access to fresh and traditional foods, cultural, religious and ethnic dietary practices, gender roles (female/male involvement in food and cooking and health promotion advertisements).<sup>37-41,44,45</sup> These factors influence individuals' and communities' health and dietary behavior supported by socio-ecological model perspectives in which policy and regulation as determinants of certain behavior.

## Limitations

In this review we could not done a meta-analysis, that is because of the heterogeneity of study participants.

## Conclusion

This systematic review summarizes comprehensive evidence to explore enablers and barriers of healthy dietary behavior based on a socio-ecological model. Health dietary behavior is influenced by huge factors at the individual, organizational, societal, community, and policy levels that vary across the globe. Based on the socio-ecological model health dietary behavior enabling and barriers influencing factors are identified with five major themes: intrapersonal, interpersonal, organizational, community, and macro/policy level. Therefore, the socio-ecological model helps to explore enabling and

barriers to healthy dietary behavior. It recommends using the model to develop effective behavior change interventions with multilevel approaches to improve health behaviors.

## Author Contributions

All authors made a significant contribution to the work reported in all these areas: they took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; agreed on the journal to which the article had been submitted; and agreed to be accountable for all aspects of the work.

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The authors declare that they have no competing interests in this work.

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