

Review

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Elements of nutrition education for people with diabetes in primary care: a scoping review

*Elementos da educação nutricional para pessoas com diabetes na atenção primária:
uma revisão de escopo*

*Elementos de la educación nutricional para personas con diabetes en atención primaria: una
revisión de alcance*

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ABSTRACT

Objective: To map the elements for the planning, implementation/engagement, and monitoring of nutrition education aimed at people with diabetes mellitus in Primary Health Care.

Method: A scoping review was conducted according to JBI guidelines. Searches were performed in databases (LILACS, BDENF, MEDLINE, Cochrane, Scopus, Web of Science, EMBASE) and grey literature sources (Google Scholar, BDTD/CAPES, Canadian-Theses-Portal, DiVA, RCAAP, OATD, WHO), with final tracking on May 4, 2025. Study selection was performed by reviewer pairs, independently and blindly, and data analysis by inductive thematic categorization.

Results: Twenty-one studies were included, predominantly in English, from middle/high-income countries, and with experimental designs. The analysis defined three categories (planning, implementation/engagement, monitoring) and eight dimensions, highlighting community involvement, cultural adaptation, active methodologies, and continuous follow-up. Gaps persist in type 1 diabetes, long-term monitoring, and research in low-income countries.

Conclusion: The findings reinforce the centrality of culturally sensitive, interactive, and interdisciplinary educational approaches that consider the cultural, social, and emotional specificities of the population served, promoting the protagonism of individuals in the self-care process.

Descriptors: Self-care; Nursing; Diabetes mellitus; Primary health care; Food and nutrition education.

RESUMO

Objetivo: Mapear os elementos para o planejamento, a execução/engajamento e o monitoramento da educação nutricional voltada a pessoas com diabetes mellitus na Atenção Primária à Saúde.

Método: Revisão de escopo, conforme as diretrizes do JBI. As buscas foram realizadas em bases de dados (LILACS, BDENF, MEDLINE, Cochrane, Scopus, Web of Science, EMBASE) e em fontes de literatura cinzenta (Google Acadêmico, BDTD/CAPES, Canadian-Theses-Portal, DiVA, RCAAP, OATD, WHO), com o rastreamento final em 04 de maio de 2025. A seleção dos estudos foi realizada por duplas de revisores de forma independente e cega, e a análise dos dados por categorização temática indutiva.

Resultados: Incluíram-se 21 estudos, predominantemente em inglês, de países de médio/alto nível socioeconômico e com delineamentos experimentais. A análise definiu três categorias (planejamento, execução/engajamento, monitoramento) e oito dimensões, salientando envolvimento comunitário, adaptação cultural, metodologias ativas e acompanhamento. Lacunas persistem sobre diabetes tipo 1, monitoramento de longo prazo e pesquisas em países de baixo desenvolvimento econômico.

Conclusão: os resultados reforçam a centralidade das abordagens educativas culturalmente sensíveis, interativas e interdisciplinares que considerem as especificidades culturais, sociais e emocionais da população atendida, promovendo o protagonismo dos indivíduos no processo de autocuidado.

Descritores: Autocuidado; Enfermagem; Diabetes mellitus; Atenção primária à saúde; Educação alimentar e nutricional.

RESUMEN

Objetivo: Mapear los elementos para la planificación, ejecución/participación y monitoreo de

la educación nutricional dirigida a personas con diabetes mellitus en la Atención Primaria de Salud.

Método: Se realizó una revisión de alcance, conforme a las directrices del JBI. Las búsquedas se efectuaron en bases de datos (LILACS, BDNF, MEDLINE, Cochrane, Scopus, Web of Science, EMBASE) y fuentes de literatura gris (Google Scholar, BDTD/CAPES, Canadian-Theses-Portal, DiVA, RCAAP, OATD, WHO), con seguimiento final el 4 de mayo de 2025. La selección de estudios fue realizada por pares de revisores, de forma independiente y ciega, y el análisis de datos mediante categorización temática inductiva.

Resultados: Se incluyeron 21 estudios, predominantemente en inglés, de países de ingresos medios/altos, y con diseños experimentales. El análisis definió tres categorías (planificación, ejecución/participación, monitoreo) y ocho dimensiones, destacando la participación comunitaria, la adaptación cultural, las metodologías activas y el seguimiento continuo. Persisten lagunas en la diabetes tipo 1, el monitoreo a largo plazo y la investigación en países de bajos ingresos.

Conclusión: Los resultados de la revisión refuerzan la centralidad de los enfoques educativos culturalmente sensibles, interactivos e interdisciplinarios que consideren las especificidades culturales, sociales y emocionales de la población atendida, promoviendo el protagonismo de los individuos en el proceso de autocuidado.

Descriptor: Autocuidado; Enfermería; Diabetes mellitus; Atención primaria de salud; Educación alimentaria y nutricional.

INTRODUCTION

Chronic non-communicable diseases (NCDs) represent one of the main global public health challenges, driven by inadequate dietary patterns and sedentary lifestyle⁽¹⁾. Among these diseases, diabetes mellitus (DM) stands out for its high prevalence and significant socioeconomic impact. It is estimated that approximately 422 million people live with DM worldwide, representing 8.5% of the adult population, with a higher incidence in countries with low economic development⁽²⁾. The increasing prevalence of DM has direct implications for health systems, including increased costs and demand for specialized services, while also negatively affecting the quality of life of affected individuals⁽³⁻⁴⁾. Consequently, addressing this scenario requires more than just statistical observation; it requires coping strategies that link the reduction of healthcare costs to the effective improvement of quality of life, shifting the focus from the treatment of acute complications to the longitudinal management of care^(1,4).

Although metabolic control is crucial for mitigating cardiovascular risks, an isolated biomedical approach centered on medications and restrictions has proven insufficient. Low treatment adherence reflects the difficulty of modifying eating behaviors rooted in cultural and socioeconomic contexts⁽³⁾. In this scenario, nutrition education emerges not as an adjunct

but as a central soft-hard technology for empowering users and promoting autonomy, overcoming the traditional prescriptive logic⁽⁴⁻⁵⁾.

The scientific literature is extensive in proving the clinical effectiveness of educational interventions in reducing glycated hemoglobin and risk factors⁽⁴⁻⁷⁾. However, previous systematic reviews^(2,8) tend to focus predominantly on clinical outcomes, leaving a significant gap regarding the operational implementation processes. Little attention has been given about the “architecture” of these interventions: how they are planned, which engagement strategies ensure adherence, and how monitoring occurs in real-world Primary Health Care (PHC) settings, where the dynamics differ from the controlled environments of clinical trials.

In PHC, evidence-based educational interventions play a fundamental role in treatment adherence and in improving the quality of life of people with DM⁽⁸⁾. Educational strategies that are culturally adapted and aligned with community needs are essential for promoting sustainable lifestyle changes, including healthy eating practices and self-care⁽⁵⁾.

Educational programs emphasize the importance of mindful eating, avoiding distractions and respecting regular meal times. In this regard, evidence suggests that structured nutrition education can positively impact eating behavior and contribute to better metabolic and clinical outcomes, reducing complications associated with DM^(5,9).

To effectively achieve these benefits, the role of healthcare professionals as educators is fundamental. They play a central role in the implementation of effective interventions, contributing to the identification of barriers and facilitators to the adoption of healthy habits⁽⁹⁾. In this context, Nursing assumes a strategic position in leading care in PHC, orchestrating educational practices that can overcome cultural barriers and use problem-posing methodologies⁽⁹⁻¹⁰⁾. For nurses to improve their praxis, it is opportune to systematize the components that make an intervention successful. The absence of a clear mapping of these elements hinders the replication of effective models and the long-term sustainability of actions⁽⁷⁻¹⁰⁾.

Therefore, this scoping review is justified, which aims to map the elements for planning, implementation/engagement and monitoring of nutrition education aimed at people with DM in PHC. The identification of these pillars aims to assist healthcare professionals in developing more robust, replicable educational strategies aligned with the complex needs of this population.

METHOD

This is a scoping review, conducted according to the JBI methodology⁽¹¹⁾ and reported following the PRISMA Extension for Scoping Reviews (PRISMA-ScR) guidelines⁽¹²⁾. For this process, the structural stages proposed for a scoping review were followed⁽¹¹⁾: definition and alignment of the objective(s) and review question; establishment of inclusion criteria; planning the search strategy; selection and extraction of data; search for evidence; selection of evidence; analysis of evidence; presentation of results; synthesis and conclusion.

The review protocol was registered on March 25, 2024, on the Open Science Framework (OSF) platform under the following Digital Object Identifier (DOI): <https://doi.org/10.17605/OSF.IO/3R4KG>

Previously to defining the question, an exploratory search was conducted in the PROSPERO, Medical Literature and Retrieval System Online (MEDLINE), and JBI Evidence Synthesis databases, but no reviews, either completed or in progress, addressing the specific focus of this study were found. To identify potentially studies and refine the terms and keywords for the search strategies, the keywords “diabetes mellitus”; “Educational intervention in diabetes”; “Primary Health Care” were initially used, connecting them with the Boolean operator AND.

To determine the research question, the Population, Concept and Context (PCC) mnemonic strategy was adopted⁽¹³⁾: Population (P): P People with type 1 or type 2 diabetes mellitus (DM1, DM2); Concept (C): Nutrition education, focusing on the elements necessary for planning, implementation/engagement and monitoring; Context (C): Primary health care or equivalent health services. Thus, the following question was defined: What are the elements necessary for planning, implementation/engagement and monitoring in nutrition education for people with diabetes mellitus in primary health care?

For this review, the following operational concepts were adopted⁽²⁾: planning, referring to the systematic organization of educational actions based on the assessment of the target population’s needs, the definition of objectives, the selection of evidence-based content and the choice of appropriate methodological strategies, including the preparation of human and material resources. Implementation/engagement, which refers to the practical implementation of planned activities, considering the interaction between professionals and users, the use of participatory methodologies, adaptation to emerging demands, and the committed involvement of participants. Finally, monitoring, which consists of the continuous collection and analysis of information about the implementation, with the aim of tracking adherence to

the planned activities, identifying obstacles, and supporting the improvement in the strategies adopted.

In compliance with the JBI recommendations for scoping reviews, primary studies and literature reviews were included, without restriction of language or time frame⁽¹¹⁾. Quantitative designs (experimental, quasi-experimental, analytical observational, and descriptive studies) as well as qualitative descriptive studies and studies using approaches such as phenomenology, grounded theory, ethnography, and action research were considered. It should be noted that the included systematic reviews were synthesized to map the concept and identify how the elements of interest are described and addressed, as well as to identify gaps in knowledge regarding these elements. Letters to the editor, conference abstracts, research protocols, studies that did not address the proposed topic, and studies without freely available full-text access in databases were excluded.

The searches were conducted in the following databases (Chart 1): Latin American and Caribbean Health Sciences Literature (LILACS), Nursing Database (BDENF), Medical Literature Analysis and Retrieval System Online (MEDLINE), The Cochrane Library (Cochrane), Scopus (Elsevier), Web of Science Core Collection (Clarivate Analytics) (Web of Science), and Excerpta Medica Database (EMBASE).

The grey literature was consulted in the following sources: Google Scholar, the CAPES Digital Library of Theses and Dissertations (*Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* - CAPES), Canadian Theses Portal, Database for Inventory, Validation, and Assessment (DIVA), Open Access Scientific Repositories of Portugal (RCAAP), Open Access Theses and Dissertations (OATD) e World Health Organization (WHO).

Chart 1 - Search strategies used in the databases consulted. Juiz de Fora, MG, Brazil, 2025

Database	Search strategy
LILACS*	(mh:(diabetes mellitus)) OR ("Diabetes Mellitus patients") OR (adult patients with diabetes mellitus) AND (educational strategies for nutritional care) OR (educational intervention in diabetes) OR (evaluation of educational intervention) OR ((food AND nutrition education)) AND ((primary health care))
BDENF†	(diabetes mellitus) OR ("Diabetes Mellitus patients") OR (adult patients with diabetes mellitus) AND (educational strategies for nutritional care) OR (educational intervention in diabetes) OR (evaluation of educational intervention) OR ((food AND nutrition education)) AND ((primary health care))
PubMed/MEDLINE‡	((Diabetes Mellitus[Mesh Terms]) OR ("Diabetes Mellitus patients") OR (Adult Patient with Diabetes Mellitus)) AND ((Educational

	strategies for nutritional care) OR (Educational intervention in diabetes) OR (Evaluation of educational intervention) OR (Food and Nutrition Education[Mesh Terms]) AND (Primary Health Care[Mesh Terms]))Filters: MEDLINE
The Cochrane Library	(Diabetes Mellitus) OR (Diabetes Mellitus patients) OR (Adult Patients with Diabetes Mellitus) in Title Abstract Keyword AND (Educational strategies for nutritional care) OR (Educational intervention in diabetes) OR (Evaluation of educational intervention) OR (Food and Nutrition Education) in Title Abstract Keyword AND Primary Health Care in Title Abstract Keyword - (Word variations have been searched)
Scopus (Elsevier)	(KEY (diabetes AND mellitus) OR TITLE-ABS-KEY (diabetes AND mellitus AND patients) OR TITLE-ABS-KEY (adult AND patients AND with AND diabetes AND mellitus) AND TITLE-ABS-KEY (educational AND strategies AND for AND nutritional AND care) OR TITLE-ABS-KEY (educational AND intervention AND in AND diabetes) OR TITLE-ABS-KEY (evaluation AND of AND educational AND intervention) OR TITLE-ABS-KEY (food AND nutrition AND education) AND KEY (primary AND health AND care))
Web of Science Core Collection (Clarivate Analytics)	(((((TS=(Diabetes Mellitus)) OR ALL=("Diabetes Mellitus patients")) OR ALL=(Adult Patients with Diabetes Mellitus)) AND ALL=(Educational strategies for nutritional care)) OR ALL=(educational intervention in diabetes)) OR ALL=(Evaluation of educational intervention)) OR TS=(Food and Nutrition Education)) AND TS=(Primary Health Care)
EMBASE [§] via Ovid	((('diabetes mellitus'/exp OR 'diabetes mellitus patients':ti,ab,kw OR 'adult patients with diabetes mellitus':ti,ab,kw) AND 'educational strategies for nutritional care':ti,ab,kw OR 'educational interventions in diabetes':ti,ab,kw OR 'evaluation of educational interventions':ti,ab,kw OR (food:ti,ab,kw AND 'nutrition education':ti,ab,kw)) AND 'primary healthcare'/exp
Google Scholar	((diabetes mellitus)) OR ("Diabetes Mellitus patients") OR (adult patients with diabetes mellitus) AND (educational strategies for nutritional care) OR (educational intervention in diabetes) OR (evaluation of educational intervention) OR ((food AND nutritioneducation)) AND ((primaryhealthcare)))
CAPES****	diabetes mellitus OR pacientes com diabetes mellitus AND educação alimentar
DIVA ^{††}	(diabetes mellitus) AND (educational strategies for nutritional care) AND (primary health care)
RCAAP ^{‡‡}	(diabetes mellitus) AND (educational strategies for nutritional care) AND (primary healthcare)
OATD ^{§§}	(diabetes mellitus) AND (educational strategies for nutritional care) AND (primary healthcare)
WHO	diabetes mellitus OR diabetes mellitus patients AND educational strategies for nutritional care OR educational intervention in diabetes AND primary healthcare

Source: Research data, 2025

Legend: * LILACS: Latin American and Caribbean Health Sciences Literature; † BDENF: Nursing Database; ‡ MEDLINE: Medical Literature Analysis and Retrieval System Online; § EMBASE: Excerpta Medica Database; **** CAPES: Coordination for the Improvement of Higher Education

Personnel Digital Library of Theses and Dissertations; †† DIVA: Database for Inventory, Validation, and Assessment; ‡‡ RCAAP: Portugal Open Access Scientific Repositories; §§ OATD: Open Access Theses and Dissertations; |||| WHO: World Health Organization.

The search in the grey literature was conducted using combinations of the keywords “diabetes mellitus,” “educational strategies for nutritional care,” and “primary healthcare,” considering the first ten pages of results from each source consulted. This restriction is justified by the high level of relevance and ranking of results provided by the algorithm, which prioritizes the most cited, recent, and most academically impactful articles.

The initial search in the databases and information sources was conducted on June 4, 2024, and was updated on May 4, 2025, maintaining the same inclusion criteria, databases, and strategies previously established.

Full-text access was obtained through the CAPES Portal using the institutional proxy of the *Universidade Federal de Juiz de Fora* (UFJF). The search strategies were developed with the support of a librarian specialized in literature reviews. For its construction, descriptors from the Health Sciences Descriptors (DeCS), Emtree Terms, and Medical Subject Headings (MeSH) databases were used, as well as synonyms and terms in natural language, combined with the Boolean operators AND and OR.

After searching the databases and other information sources, the retrieved records were exported to the Rayyan[®] reference manager. At this stage, duplicates were identified and removed, ensuring that each study was considered only once before the selection process based on the research question.

The selection and screening of documents were performed independently by pairs of reviewers. In the first phase, titles and abstracts were screened in a blinded manner. Disagreements were resolved through consensus between reviewers and, when necessary, with the involvement of a third reviewer. Documents meeting the inclusion criteria proceeded to the second phase, in which full-text articles were assessed with a focus on the review question.

Data extraction from the selected documents was conducted by pairs of independent reviewers using a standardized spreadsheet in Microsoft Excel[®]. Extracted variables included authorship, year of publication, language, country of origin, study type (primary study or review), objectives, methodology, and main findings. For the included literature reviews, information regarding objectives, methodology, and principal conceptual conclusions or identified gaps was extracted, without reanalyzing the primary data from those reviews.

Initially, a pilot test was conducted with 25 documents to train reviewers and ensure consistency in applying the eligibility criteria. Data were subsequently extracted and verified by two independent reviewers. When necessary, a third reviewer participated in the validation process and acted as a mediator to achieve consensus among the authors. The mapping of information followed the recommendations of the JBI instrument for the characterization of evidence sources⁽¹¹⁾.

Data extraction, analysis, and presentation followed the methodological guidance of the JBI^(11,13). Data analysis adopted a qualitative-descriptive approach, with thematic categorization emerging inductively through the identification of recurring patterns across the included studies⁽¹²⁾. In this review, category was understood as a broader analytical level that organizes and integrates a set of related dimensions around a common interpretive axis aligned with the objectives of the review. The dimensions, in turn, correspond to internal subdivisions of each category, specifying more delimited aspects of the phenomenon (for example, different focuses, strategies or contexts described in the studies). This approach allowed the construction of categories and dimensions directly from the data, reflecting the essence of the interventions identified. The dimensions were developed from the synthesis of similar findings and subsequently grouped into broader categories. The narrative synthesis presented the findings in an organized and understandable manner, facilitating the identification of knowledge gaps and implications for practice. The results were presented through tables, diagrams and conceptual categories, contributing to the interpretation of the data. Visual representations, such as thematic maps, were employed to demonstrate the relationship of the findings to the research question and the study objectives.

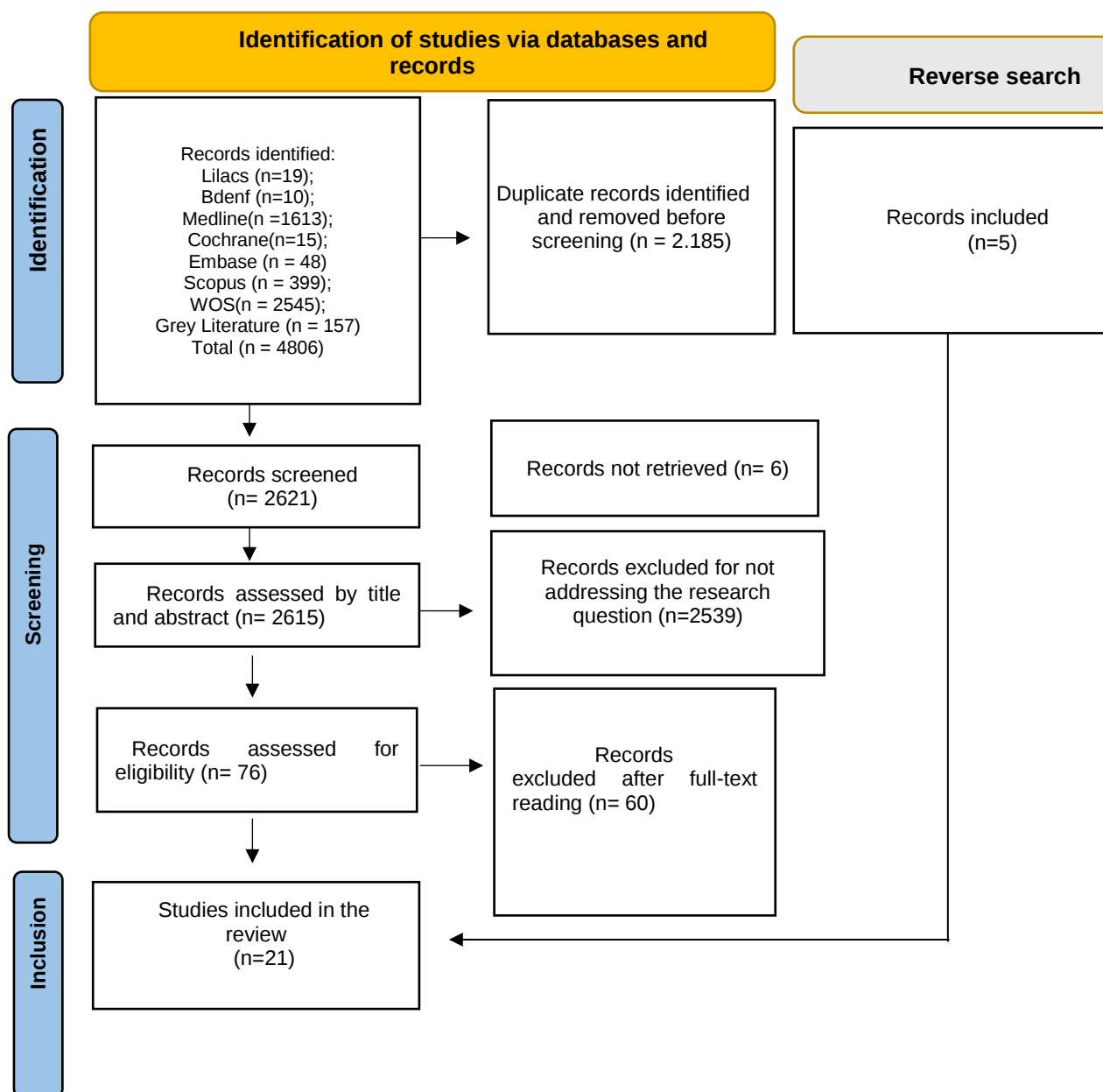
RESULTS

A total of 4,806 records were identified, of which 2,185 were automatically removed before the screening stage because they were duplicates. Of the remaining 2,621 records, six were excluded because neither an abstract nor a full text was available for assessment. In the title and abstract screening, 76 studies were considered potentially eligible for full-text reading. At this stage, 60 studies were excluded and five new studies were included through reverse search in the reference lists of the selected articles. The main reasons for exclusion at this stage were the lack of focus on nutrition education and the absence of an approach in PHC.

Thus, at the end of the process, 21 studies were included in the review analysis.

The flowchart presenting the search results and study selection process is shown in Figure 1.

Figure 1 - Flowchart developed according to PRISMA-ScR recommendations and adapted to include the publications identified in the grey literature and reverse search (n=21). Juiz de Fora, MG, Brazil, 2025.



To clarify the presentation of the results, the most relevant data from each included study were organized into a summary table (Chart 2).

Chart 2- Characterization of the included studies by author, country, language, objective, study method, and participants. Juiz de Fora, MG, Brazil. 2025

Authors	Country/Language	Objective	Method	Participants
Asaad et al. (2016) ⁽¹⁵⁾	Canada/ English	To assess the effectiveness of an intervention on glycemic control and dietary adherence	Quasi-experimental study	73 patients with type 2 diabetes mellitus
Cabr�-Font et al. (2021) ⁽¹⁶⁾	Spain/ English	To evaluate the effects of a structured therapeutic education program for patients with diabetes mellitus	Prospective longitudinal study with pre- and post-intervention assessment	161 patients with type 2 diabetes mellitus
Carpenter et al. (2019) ⁽¹⁷⁾	United States of America/ English	To summarize and critically appraise interventions supporting type 2 diabetes self-management	Comprehensive integrative review of 70 studies	11,272 patients from 17 countries
Celada-Roldana et al. (2023) ⁽¹⁸⁾	Spain/ Spanish	To analyze the impact of nutrition educational intervention on cardiovascular risk factors	Quasi-experimental study	93 patients with type 2 diabetes mellitus
Chen et al. (2022) ⁽¹⁹⁾	China/ English	To evaluate the effect of dietary management tools on improving dietary skills	Randomized clinical trial	1,100 patients with type 2 diabetes mellitus
Davies et al (2024) ⁽²⁰⁾	United Kingdom/ English	To evaluate the effectiveness of the Embedding Package, a self-management program for type 2 diabetes in primary care	Cluster randomized clinical trial involving 64 healthcare units	92,977 patients with type 2 diabetes mellitus
Gall� et al. (2017) ⁽²¹⁾	Italy/ English	To assess changes in health perception and adherence to recommendations following an intervention	Nine-month prospective study	130 patients with type 2 diabetes mellitus
Gamboa et al	Spain/ English	To evaluate the	Randomized	171 patients

(2013) ⁽²²⁾		effectiveness of the Spanish Diabetes Self-Management Program in primary care settings	clinical trial	with type 2 diabetes mellitus
Gebreyesus et al. (2024) ⁽²³⁾	Ethiopia/ English	To evaluate the effects of patient-centered nutrition education on dietary behavior and clinical indicators	Quasi-experimental study	178 patients with type 2 diabetes mellitus
Gün et al. (2010) ⁽²⁴⁾	Turkey/ English	To determine adherence to treatment recommendations among patients with diabetes and associated factors	Cross-sectional study	555 patients with diabetes mellitus
Huang et al. (2010) ⁽²⁵⁾	Taiwan/ English	To assess the effectiveness of diabetes management on glycemic control and diet practices	Randomized clinical trial	154 patients
Isaksson et al. (2021) ⁽²⁶⁾	Sweden/ English	To compare the effects of different nutrition education programs on glycemic control and quality of life	Randomized clinical trial	159 patients with type 1 diabetes
Kitazawa et al. (2024) ⁽²⁷⁾	Japan/ English	To evaluate lifestyle intervention using a smartphone application and isCGM on glycemic control and body weight	Randomized clinical trial	168 patients with type 2 diabetes
Lopes, Rodrigues, Santos (2014) ⁽²⁸⁾	Brazil/ English	To analyze the effectiveness of individualized nutrition education	Quasi-experimental study	11 adults and older adults with diabetes mellitus
Martín-Payo et al. (2021) ⁽²⁹⁾	Spain/ English	To evaluate the effectiveness of a behavioral intervention based on the Behavior Change Wheel	Pilot intervention with educational sessions	32 patients
Merakou et al. (2015) ⁽³⁰⁾	Greece/ English	To evaluate the impact of a brief group educational	Randomized clinical trial	193 patients with type 2 diabetes mellitus

		intervention among patients		
Nikbina et al. (2020) ⁽³¹⁾	Iran/ English	To evaluate the effectiveness of nutrition education and counseling on patients' metabolic control	Quasi-experimental study	90 patients with type 2 diabetes
Oliveira, C.G. (2024) ⁽³²⁾	Brazil/ Portuguese	To assess the effectiveness of group educational strategies and telephone support	Randomized clinical trial	128 patients with type 2 diabetes mellitus
Rusdiana et al. (2018) ⁽³³⁾	Indonesia/English	To evaluate the effect of short-term education on glycemic control	Quasi-experimental study	40 patients with type 2 diabetes
Rusdiana et al. (2020) ⁽³⁴⁾	Indonesia/English	To evaluate the effect of short-term education on diabetes self-management among patients	Quasi-experimental study	40 patients with type 2 diabetes
Torres et al. (2018) ⁽³⁵⁾	Brazil/ Portuguese	To evaluate the effectiveness of an educational program for diabetes mellitus	Randomized clinical trial	470 patients with type 2 diabetes

Source: Research data, 2025

Based on the analysis of Chart 2, it was observed that all included studies were published from 2010 onwards. Of these, 90.5% (n = 19)^(15-17,19-31,33-34) were published in English, and 81.0% (n = 17)^(15,18-20,22-23,25-28,30-35) adopted an experimental or quasi-experimental design, with randomized clinical trials being the most frequent study design (n = 9)^(19-20,22,25-27,30,32,35). Most studies primarily aimed to evaluate the effectiveness of nutrition education or diabetes self-management interventions in PHC. Regarding the target population, 90.5% (n = 19)^(15-25,27-35) of the studies were conducted exclusively with individuals diagnosed with type 2 diabetes mellitus.

Concerning country distribution, Spain and Brazil accounted for the highest number of publications, with four (19.0%)^(16,18,22,29) and three (14.3%)^(28,32,35) studies, respectively, followed by Indonesia with two studies (9.5%)⁽³³⁻³⁴⁾. The remaining countries each contributed one study. Considering geographical distribution by continent, Asia and Europe concentrated the largest number of countries producing scientific evidence, accounting for

33.3%)(^{19,24-25,27,32,33-34}) and (33.3 %)(^{16,18,21-22,26,29-30}), of the studies, respectively, followed by the Americas (23.8 %)(^{15,17,28,32,35}) and Africa (4,8 %)(²³).

It is important to note that, among the included studies, an integrative review(¹⁷) was used for conceptual mapping and identification of gaps in the literature, and not for empirical reanalysis of its primary data.

From the grouping by thematic analysis of the included studies, considering the research question and the proposed objective, the key elements for the planning, implementation/engagement and monitoring of educational interventions in nutrition aimed at people with DM in PHC emerged. The synthesis was structured into three categories that are subdivided into eight dimensions and their descriptions (Chart 3).

A category is understood as a broader grouping of information or themes that encompasses several related ideas(³⁶). The term dimension refers to the specific aspects or components within a category, that is, the subdivisions or parts of a category(³⁶).

Chart 3- Synthesis of elements for the planning, implementation and monitoring of nutrition education interventions for people with diabetes mellitus in primary health care. Juiz de Fora, MG, Brazil. 2025

Category	Dimension	Description of the dimension
Planning	Organization and Planning	Disseminate information in advance, adapt educational materials to the target audience profile, ensure a comfortable environment, and adjust the schedule and duration of activities (^{15-19,21,23-30,32-34-35}).
	Content and Didactics	Adapt content to participants' needs; use useful, evidence-based educational materials addressing relevant topics(^{15-32,35}).
Implementation and Engagement	Participation and Interactivity	Promote practical activities, encourage active participation, provide opportunities for questions and discussions, use real-life examples, and stimulate the exchange of experiences(^{15-16,18,21,23-25,27-30,31-35}).
	Knowledge and Behaviors	Assess the understanding about diabetes, emphasize the importance of glycemic control, identify risks and complications, recognize warning signs and reinforce confidence in diet choices(^{15-25,27-35}).
	Self-Care/Self-Management	Emphasize the importance of healthy eating and physical activity, provide guidance on appropriate blood glucose monitoring, adaptation of daily routines, and adherence to treatment(^{15-20,22-30,34-35}).

	Emotional and Psychosocial Aspects	Provide emotional support, strengthen confidence in self-care, address concerns, facilitate the sharing of difficulties, and present strategies for coping with stress ^(15-16,19-20,27,29-30,35) .
Monitoring	Barriers and Treatment Adherence	Identify and reduce barriers to self-care, improve time management, present strategies for maintaining treatment, and encourage participant motivation ^(15-16,19,22-23,26-27,29-31,33-34) .
	Overall Satisfaction	Evaluate participant's experience with the activity, their interest in participating again, and their willingness to recommend it to others ^(15-16,19,24,27-30,33,35) .

Source: Research data, 2025

In summary (Figure 2), the Planning category encompasses the dimensions Organization and Planning, and Content and Didactics. The first highlights the importance of prior organization of actions, the suitability of educational materials to participants' profiles, and the guarantee of appropriate structural conditions, such as a comfortable environment, accessible schedules, and a duration compatible with the proposed activities. The second dimension refers to content and didactics, with an emphasis on adapting the material to the needs of the target group and the use of evidence-based resources.

The Implementation and Engagement category comprises four dimensions: Participation and Interactivity, Knowledge and Behaviors, Self-Care/Self-Management, and Emotional and Psychosocial Aspects. Participation and Interactivity addresses the protagonism of participants through educational practices, open discussions, and exchanges of experiences. The Knowledge and Behaviors dimension emphasizes understanding diabetes, its risks and complications, as well as the role of diet in glycemic control. The Self-Care and Self-Management dimension encourages the adoption of healthy habits, such as a balanced diet, physical activity, and adherence to treatment. Finally, the Emotional and Psychosocial Aspects refer to addressing doubts, strengthening self-confidence, and developing strategies to cope with stress and the challenges with disease management.

The Monitoring category encompasses the dimensions of Barriers and Treatment Adherence, and Overall Satisfaction. The first includes identifying and reducing barriers to self-care, proposing strategies for maintaining treatment, and stimulating participant motivation. The second focuses on evaluating the participant's experience with the activity, their interest in participating again, and their willingness to recommend it to others.

Figure 2- Thematic map on nutrition education for people with diabetes mellitus in primary health care. Juiz de Fora, MG, Brazil. 2025.



Source: image created via Canva® (2025)

DISCUSSION

This scoping review not only synthesizes the key elements for the planning, implementation/engagement, and monitoring of nutrition education interventions for people with DM in PHC but also reveals the need for a more in-depth and contextualized approach⁽¹⁵⁻³⁵⁾. The predominance of publications from 2010 onwards reflects an evolution in addressing DM, signaling a shift from a purely biomedical model to a paradigm centered on promoting autonomy and comprehensive care⁽¹⁵⁻³⁵⁾. However, this change still faces biases that compromise equity in the production and application of knowledge. These biases, instead of universalizing evidence-based care, exacerbate inequalities and challenge the real effectiveness of interventions in various PHC settings, especially those with greater vulnerabilities and lower representation in the scientific literature⁽¹⁵⁻³⁵⁾.

The prevalence of the English language in publications^(15-17,19-31,33-34), although facilitating global dissemination, raises concerns regarding the underrepresentation of contexts and realities from low-income countries. This limitation may obscure valuable experiences and prevent locally adapted strategies from gaining visibility, thereby perpetuating inequalities in the construction of health knowledge^(15-17,19-31,33-34). The predominance of experimental or quasi-experimental studies, although essential for measuring clinical outcomes, tends to overlook subjective and contextual aspects that are crucial for adherence to and success of health interventions^(15,18-20,22-26,28-35). The scarcity of qualitative or

mixed approaches limits the in-depth understanding of the sociocultural and behavioral factors that influence nutrition education in PHC⁽³⁷⁻³⁹⁾.

Regarding the target audience, most studies sampled people with type 2 diabetes, which is expected given its higher global prevalence^(15-23,27,29-35). However, this issue points to a gap in the literature, indicating the need to expand investigations to include people with type 1 diabetes, prediabetes, or metabolic risk, in order to strengthen early and preventive educational actions⁽²⁴⁻²⁶⁾.

Regarding geographical distribution by country, only Brazil and Spain had more than two publications each^(16,18,22,28,32,35). This concentration indicates that, even in countries with effective policies aimed at promoting health and strengthening PHC, scientific production on the subject is still limited or insufficiently disseminated. In Brazil, this gap is worrying given the high prevalence of DM and the broad coverage of the SUS, which offers favorable conditions for the development of large-scale educational interventions^(28,32,35). In the Asian context, the higher concentration of studies may reflect the growing impact of DM in countries such as China and Indonesia, which have invested in management strategies at the primary level^(19,33-34). In contrast, the limited representation of African countries highlights structural challenges in research, epidemiological surveillance and access to PHC, as well as the exclusion of local knowledge from global scientific production, a reflection of the called coloniality of knowledge^(23,40). This disparity compromises the ability to develop globally relevant and culturally sensitive nutrition education strategies.

The analysis of scientific production on nutrition education for people with DM1 and DM2 in PHC identified eight structuring dimensions, grouped into three main categories: planning, implementation/engagement and monitoring⁽¹⁵⁻³⁵⁾. This categorization, which emerges from the findings, demonstrates the inherent complexity of the health education process, going beyond fragmented approaches. While some studies focus predominantly on the planning stage, with emphasis on situational diagnosis and goal setting⁽²⁴⁻²⁵⁾, others prioritize the execution of interventions, valuing participatory and patient-centered methodologies^(21,30). However, monitoring remains underexplored and constitutes an important gap identified by authors^(29,31).

The first category, with its dimensions of Organization and Content/Didactics, underlines that the success of an intervention is not limited to “what” is taught, but fundamentally to “how” and “where” it is transmitted. The sociocultural suitability of materials and environments is a pillar for adherence and engagement^(15-19,21,23-30,32-34-35).

In the Implementation and Engagement category, which encompasses Participation and Interactivity, Knowledge and Behaviors, Self-Care/Self-Management, and Emotional/Psychosocial Aspects, it reveals that the effectiveness of nutrition education depends on a multifaceted approach. Merely transmitting knowledge is insufficient; it is imperative to promote the individual's protagonism, value the exchange of experiences, and recognize the influence of emotional and psychosocial factors in the control of DM^(15-16,18,21,23-25,27-30,33-35). This integrated approach is crucial for transforming information into behavior and sustaining self-care over the long term^(15-16,19-20,27,29-30,35).

Finally, the Monitoring category, comprising the dimensions Barriers/Treatment Adherence and Overall Satisfaction, emerges as the weakest and most underexplored link in the literature. The persistence of gaps in continuous monitoring represents a significant risk to the sustainability of interventions, as it hinders the early identification of obstacles and the adaptation of strategies. This review demonstrates that, although Planning and Implementation receive considerable attention, Monitoring still lacks sufficient focus and remains a critical area for improving the effectiveness of actions^(15-16,19,24,27-30,33,35).

In summary, the eight dimensions organized into three categories show the complexity and multidimensional nature of nutrition education interventions in PHC, requiring interactive, culturally sensitive, and person-centered actions. This analytical framework contributes to improving educational practices among nurses and other healthcare professionals, in accordance with PHC principles⁽¹⁵⁻³⁵⁾.

The systematization of the identified elements may support nursing practice in PHC by enhancing the quality of educational care, guiding person-centered strategies with participatory methodologies sensitive to sociocultural realities, promoting the adoption of healthy eating behaviors, strengthening the bond with healthcare services, and improving clinical and psychosocial outcomes. The importance of continuous monitoring of interventions should be emphasized, based on indicators such as treatment adherence, knowledge acquisition, and user satisfaction, as well as the articulation among levels of care and the inclusion of family and community in the actions.

The gaps highlighted by this review are directly consistent with the National Agenda of Priorities for Health Research (*Agenda Nacional de Prioridades de Pesquisa em Saúde - ANPPS*)⁽⁴⁰⁾ of the Ministry of Health, which aims to align scientific production with the needs of the Unified Health System (*Sistema Único de Saúde - SUS*), especially in the areas of chronic diseases, nutrition and primary care. In the context of professional nursing practice

and management, it is imperative that the findings of this review and the ANPPS guidelines guide investments in the continuous training of nurses and other PHC teams. This would support a more strategic approach in the planning, implementation and, crucially, in monitoring nutrition education actions, overcoming the prescriptive model. The strengthening of primary care and the integrated approach to nutrition in the context of DM, as advocated by the ANPPS, may be a catalyst to strengthen patient empowerment and ensure the effective application of research findings into SUS practice⁽⁴⁰⁾.

Among the limitations of this review is the exclusion of studies addressing other types of diabetes or those conducted outside the PHC context, which may have restricted the scope of the findings. Furthermore, as with all scoping reviews, no critical assessment of the methodological quality of the included studies was performed, nor was it possible to quantitatively synthesize the results. The researchers' interpretation of data may also have introduced biases. For future research, it is recommended to conduct qualitative or mixed-methods studies that explore users' experiences in greater depth, as well as the development and validation of specific instruments to evaluate nutrition education interventions in the PHC context, including objective and subjective aspects of the educational process.

CONCLUSION

This scoping review identified eight structuring dimensions of nutrition education for people with diabetes in Primary Health Care, organized into three categories – Planning, Implementation/Engagement, and Monitoring – which highlight the complexity and procedural nature of these interventions.

The matrix of categories and dimensions proposed provides a concise framework to guide the design, implementation, and evaluation of nutrition education interventions by nurses and other professionals, in line with the needs of health services.

Moreover, by highlighting monitoring as the weakest link and the underrepresentation of type 1 diabetes, prediabetes, and contexts of greater vulnerability, this review identifies priorities for research and practice in Primary Health Care.

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Data and material availability

Access to the dataset is available upon request from the corresponding author.

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