

Problematization with the Magueréz arch in cooking workshops: A low cost strategy for nutritional education of people with diabetes



<https://doi.org/10.56238/interdiinnovationscresce-088>

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ABSTRACT

Nutrition education strategies are important for diabetics to become aware of their self-care, physiological needs and food choices. Objective. To use cookery workshops to stimulate good habits aiming the health promotion of people with diabetes (PWD) and generate cost savings for both patients and the public health system. Methodology. Twenty PWD, attended at Basic Health Units in Ouro Preto, Brazil, voluntarily participated in monthly meetings, four/semester, lasting ~120 minutes each, totalling eight meetings. Magueréz arc-based problematisation method was applied involving five steps: 1- observation of reality, 2- key points, 3- theorisation, 4- hypotheses of solution and 5- discussion of reality. Results and discussion. Through cooking, the importance of sharing health care strategies, strengthening collective spaces for case discussion and promoting permanent health education involving diabetics was highlighted. The problematization associated with the Magueréz arc as an educational tool improved the ability to choose and prepare food for a healthier diet. It also improved the way of life and family relationships, especially those diabetes living alone. And, in general, have an improvement in the quality of life of people with diabetes and their families. Conclusion. The Magueréz arc-based



problematization in cooking workshops changed the dietary practices and improving the self-care processes of diabetics, decreasing their likelihood of suffering from the side effects of the disease.

Keywords: Diabetes, Cookery workshops, Problem-based learning, Maguerez arc, Nutritional education, Food behaviour.

1 INTRODUCTION

Diabetes is a metabolic syndrome of multiple and permanent origin, resulting from the lack or inability of insulin to adequately exert its effects, raising blood sugar levels (hyperglycaemia) with consequent reduction in the use of glucose by cells (Campos et al., 2020). According to the International Diabetes Federation (IDF), 1 in 10 adults live with diabetes, reaching 537 million, with the worrying prospect of reaching 783 million adults with diabetes by the year 2045. Diabetes accounted for at least US\$966 million of the world's healthcare expenditure in 2021, with an increase of 316% over the last 15 years and there will be a 5% increase in diabetics in Central and South America, reaching 49 million adults (IDF, 2022). Despite the efforts of the Brazilian public Health Care System (SUS), Brazil is the fourth country in the world in number of adults with diabetes (7.7% of Brazilians 18 or older, in 2019). It is estimated that the annual cost in Brazil could reach R\$27 billion by 2030 (Campos et al., 2020). Changes in people's lifestyle habits and increasing urbanisation, tiring work routines, unhealthy eating habits, increased consumption of ultra-processed products, sedentary lifestyles, the ageing population and obesity contribute to raising the prevalence of diabetes (Wu et al., 2022).

The treatment of diabetes involves metabolic control, use of medication and lifestyle changes, such as adequate and balanced diet and regular physical activity (Marques et al., 2019). Multiprofessional interventions are important for people with diabetes to adopt daily self-care actions to prevent possible acute and chronic complications of this disease (Marques et al., 2019; Wu et al., 2022). The patient's acceptance to change their lifestyle and willingness to seek help to solve the problems related to the disease and the support of their family are important factors (Marques et al., 2019). During the process of changing their eating and lifestyle habits, people with diabetics should often be assessed and guided by a nutritionist (Marques et al., 2019; Li et al., 2023). And, it is important that this professional establishes food and nutrition education strategies aimed at diabetics. And, also consider that this strategy is a fundamental part of the complete care of the patient with diabetes, enabling greater impact on their needs and at the same time being a facilitator of conscious food choices (Marques et al., 2019; Campos et al., 2020; Li et al., 2023). In addition to meeting an individual's nutritional and/or pathological needs, eating also involves the act of preparing food. This process involves affectivity and arouses visual, olfactory, auditory, gustatory, and tactile sensations such as the texture and crunchiness of a particular ingredient. It also awakens memories and affective sensations,



accompanied by symbolic values and memories loaded with striking feelings of a certain moment in the life of an individual or a group (Diez-Garcia et al., 2011; Altoé; Menotti; Azevedo, 2019; Li et al., 2023).

More than an instinct, the need to eat represents a search for the meanings of life (Li et al., 2023). Thus, the act of eating promotes the creation and rescue of personal memories, or significant moments experienced by individuals, or involves sensations built at certain times of their lives, which constitute a great symbolic value (Doyle et al., 2023). Furthermore, is also linked to food hedonism, through psychic and physiological rewards that food provides to the individual (Lopes et al., 2020; Doyle et al., 2023). In this case, hedonism, the philosophy that defends the search for pleasure as the purpose of human life, is intertwined with childhood memories or memories that the individual maintains of flavours, aromas, familiar places and places experienced throughout his lifetime (Marques et al., 2019; Campos et al., 2020; Li et al., 2023). Therefore, applicable models of health promotion and prevention of diseases or sequelae, through experiences with local cuisine and culture, value knowing how to prepare a food recipe and the final flavour of the finished food (Doyle et al., 2023; Li et al., 2023). Cooking also covers the cultural context of each subject involved, through guidance and coordination of food and nutrition actions, at different levels of primary health care (Marques et al., 2019; Li et al., 2023). Experiencing cooking contributes to the individual achieving a nutritionally adequate diet, in an integrated, equitable, intersectoral and participatory manner (Diez-Garcia et al., 2011; Altoé et al., 2019; Li et al., 2023).

Most people with diabetes and other chronic diseases do not follow nutritional guidelines correctly for various reasons (Marques et al., 2019; Li et al., 2023). Therefore, the adoption of nutritional education strategies through cooking based on the relationship between food, culture and health, focusing on food and all that it means is important to modify the behaviour of people with diabetics. And, to contextualise these aspects it is interesting to use the Maguerez arc which is a methodological path aimed at the formation of the individual, involving observation of reality, key points, theorization, hypothesis of solution and application of reality (Berbel; Gamboa, 2012; Fujita et al., 2016; Guerra et al., 2020).

In this scenario, cooking workshops with problematization based on the Maguerez arc were used aiming at promoting the health of people with diabetes and generating cost savings for both patients and the public health system.

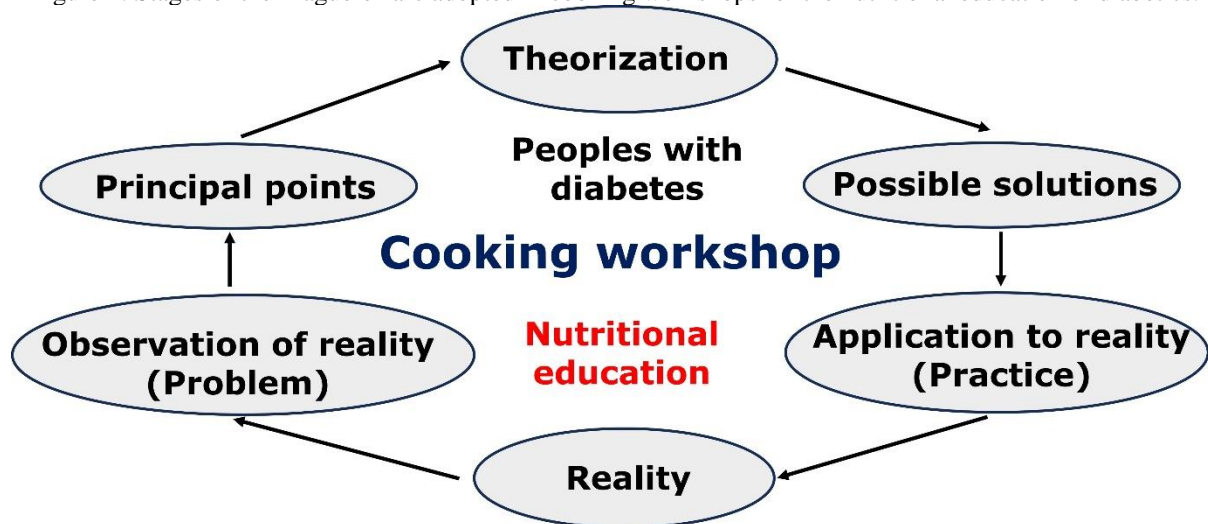
2 METHODOLOGY

This study was based on the theoretical assumptions of the problematisation methodology, with the application of the Maguerez arc (Guerra et al., 2020; Soares et al., 2023).



Twenty adults with diabetes, attended in Basic Health Units of the Municipality of Ouro Preto, Minas Gerais, Brazil, voluntarily participated in the cooking workshops, from March to October 2022. Monthly meetings were held, four per semester, with an average duration of 120 minutes each, totalling eight meetings. The activities involved practical cookery workshops through which the contents were taught involving the elaboration of culinary recipes, lectures, food and nutrition education actions, popular songs and conversation circles. Problematisation associated with the Maguerez arc (Berbel; Gamboa, 2012; Fujita et al., 2016; Guerra et al., 2020; Soares et al., 2023) was adopted as a way of promoting the health of people with diabetes. As suggested by Berbel and Gamboa (2012), the stages of the Maguerez arc adopted in cooking workshops aiming the nutritional education of diabetics involved: (1) observation of reality, (2) principal points, (3) theorization, (4) possible solutions and (5) application of reality through practice (Figure 1).⁽⁹⁻¹³⁾.

Figure 1: Stages of the Maguerez arc adopted in cooking workshops for the nutritional education of diabetics.



Source: Authors, based on Berbel and Gamboa, (2012).

To apply the Maguerez arc, several original food recipes were presented to the volunteers. Then, the recipes were adjusted to obtain a healthier food for people with diabetes. The most favoured recipes of the group were elaborated. At the end of each workshop, the ready meals were tasted and evaluated qualitatively. Then the problematisation method was applied through which the participants expressed the positive and negative points of each ready recipe, proposing a space for reflection on the subjective processes involving food (Spink, Menegon, Medrado, 2014).

The cookery workshops were planned in two stages. In the first stage, tasks of observation of the reality were conducted, *i.e.*, choice of preparations and ingredients that would be worked on. Subsequently, the coordinator of the workshops carried out a survey of the key points, together with the volunteers, of the types of nutrients that could be replaced by others of better metabolisation for people with diabetes. In the second stage, the recipes duly adapted to the reality of people with diabetes



were elaborated with the substitutions of nutrients in the preparations, according to the recipe, classified as priorities in each of three food groups, that is: **1: Group of carbohydrates** (Priority 1: Inclusion of low glycaemic fruits and vegetables and/or dark green leaves in preparations according to the recipe. / Priority 2: Standardisation of the portion size of fruits (grapes, watermelon, oranges, mangoes and meringues, breads, cakes, pasta, among others. / Priority 3: inclusion low portion of a high glycaemic food such as rice, cassava, potato, noodles, farofa, corn mash or corn pudding, or yam in the recipe or meal). **2: Group of proteins** (Priority 1: inclusion of white and lean meats, such as fish, sardines, chicken breast, soya beans, chickpeas, or peas. / Priority 2: inclusion of skimmed milk and dairy products (fresh cheese, ricotta or ricotta cream, skimmed yoghurt, tofu, among others) in the preparations. / Priority 3: inclusion of only one protein source in the preparation. **3: Group of lipids** (Priority 1: inclusion of extra virgin olive oil and vegetable oil in preparations, in the quantities standardised in cooking recipes. / Priority 2: standardisation of portion sizes. / Priority 3: inclusion of a single source of vegetable fat in the preparation).

For subsequent development of a reflective process in the stages of transformation of people with diabetics in relation to its reality, with regard to food, the main information obtained during the activities were recorded in a diary (recipe form). The recipes of food prepared in the cookery workshops are freely available in the institutional repository of Universidade Federal de Ouro Preto (RIUFOP, 2017).

In all the cooking workshops, the nutritional needs of eutrophic and non-critical diabetes patients were obeyed, which is 25-35 kcal/kg and 1.0-1.5 g/kg of protein, and the distribution of macronutrients should consider the metabolic and glycaemic control and the insulin regimen of the patient, according to the American Diabetes Association (ADA, 2022).

The cost of preparing the recipes was estimated using the monetary value of each food item, available from the national broad consumer price index (IPCA) of the Instituto Brasileiro de Geografia e Estatística, in the form of monthly percentage variation by food groups, published in May 2023 (IBGE, 2023). The value of each cooking workshop was established as the sum of the cost of the ingredients used to prepare the recipes of the day, the cost of electricity, water, cooking gas consumption, printed material and the health professional responsible for the activities.

The cooking workshops followed the guidelines from resolutions 466 of 2012, 510 of 2016, and 580 of 2018 and were carried out as part of the programme entitled: "Saberes e Sabores em Oficinas de Culinária" approved by the Ethics Committee of the Universidade Federal de Ouro Preto, under appraisal number CAAE-0122.0.214.000-09.



3 RESULTS

The cookery workshops were considered as a tool for promoting the health of people with diabetics. According to the participants' reports, through the problematization process with the Maguerez arc, an improvement was observed in the coexistence of people with diabetics, with their families and improved depression control. The nutritional knowledge transmitted allowed people with diabetics to acquire a better ability to choose and prepare food for a healthier life (Santos et al., 2023).

In each cooking workshop were spent about US\$60.00, about US\$3.00/people with diabetics. Thus, a total of US\$480.00 was spent on twenty people with diabetics in the eight cooking workshops. Therefore, it was inferred that cooking workshops are a low-cost activity for the prevention of diabetes complications (Santos et al., 2023).

The workshops provided moments of pleasure and exchange of experiences among the volunteers, especially for those who live alone. The results showed an improvement in the quality of life (Table 1) of the assisted population, proving that the cooking workshops constitute an important space for food and behavioral re-education of people with diabetes (Santos et al., 2023).

During the cookery workshops, autonomy, reflection and understanding were developed in the diabetic volunteers as a way to improve their health, stimulate healthy eating, work on empowerment and culinary skills through autonomous activities in collective cooking. After observing the reality, the problematic points of each theme were worked out and compared with the literature (theory). Suggestions for improving the recipes (hypotheses) were then established based on the group's experiences and habits. In the cooking workshops, the act of inserting fibers into farofas (crumbs), preparing cauliflower and broccoli pizzas, preparing spices and herbs for salads to replace salt, among others, was encouraged (Santos et al., 2023).

The suggestions were discussed with the participants and group discussions were held around the central theme, object of study in the workshop, with various recipes and construction of practical recipes based on the reality, eating habits and customs of the group. The Maguerez arc highlighted the importance of adopting strategies to investigate what hinders or prevents participants from eating properly, thus enabling a group intervention. The results observed using the Maguerez arc in the cooking workshops as a strategy to improve the psychophysiological conditions of people with diabetics are shown in Table 1 (Santos et al., 2023).



Table I: Results observed through problematisation associated with the Maguerez arc in cooking workshops used as strategy to improve food choices and nutrition education of people with diabetics

Parameter	Results observed based on the Maguerez arc	
	During application	After application
Observation of reality	Use of high-calorie recipes High intake of carbohydrates High intake of fats (margarine, fried foods, savoury snacks, cracklings, fatty meats, butter); High consumption of ultra-processed foods (industrialised meat broth, powdered or carton juices, biscuits, sausages, soft drinks, sweets, pizzas and sandwiches); Low fibre intake; Low intake of fruit, vegetables and pulses; Low intake of calcium-rich foods; Lack of standardisation of portions Lack of dietary routine.	Increase fibre intake; Reduced consumption of ultra-processed foods, Replacement of industrialised meat broths with fresh or dried seasonings (herbal salt); Increased consumption of natural juices (green juice, homemade soda, fruit and vegetable juices); Preparation of homemade snacks (biscuits prepared with functional foods, homemade breads, cakes with fruit and fruit peels); Increased consumption of fibre (granola, oats, chia, linseed included in recipes such as natural yoghurts, fruit salads); Increased intake of calcium-rich foods (milk, natural yoghurt, low-fat cheeses); Increased fruit consumption (cocktails, juices, cakes, fruit salads, with natural yoghurt); Adaptation to the eating routine (eating every 3 to 3 hours). Standardisation of portions, through knowledge of home measures.
Key-points	Sodium; Trans fats; Simple sugars; Ultra-processed foods.	Reduced consumption of sodium, trans-fats, simple sugars and ultra-processed foods.
Theorization	Theoretical explanation based on scientific data on the importance of replacing inappropriate foods with healthy foods and the adaptations to healthy habits, according to the reality presented by them.	People with diabetics showed greater motivation, reflection and understanding to seek new information on functional foods, healthy recipes and substitutions, according to their reality.
Hypotheses	Adaptation of the usual recipes for healthy recipes, including fruits and vegetables, aromatic herbs and spices respecting the food culture of people with diabetics.	According to personal taste, diabetics adapted the recipes of habitual consumption with healthier foods or components, through the inclusion of fruits, vegetables, legumes, foods rich in fibre and calcium.
Practical application to reality	Practical cookery workshops, with adapted recipes, after tasting, a qualitative evaluation of the food was carried out, conversation circles and clarifications on the doubts presented by the participants.	After adapting, preparing and tasting the recipes in the workshops, the participants started to adopt them in their homes, together with their families.

Source: Santos et al., 2023.

The cooking workshops led to beneficial changes in the routine of people with diabetics and their families, such as the inclusion of certain foods in the family menu and induced families to make preparations together (Table 1). During the workshops, the act of cooking improved the people with diabetics understanding of the complexity of the activities involved, from planning and organising to food production. And, it was possible to observe that individuals organised themselves in varied and appropriate ways for each case. Thus, in addition to involving the issue of nutrients and food, culinary practices represented a good strategy for bringing family members of people with diabetics closer



together (Santos et al., 2023).

The Maguerez arc used in the cookery workshops (Figure 1) provided a pathway for action on the problems experienced by people with diabetics. The process involved five steps: Observation of the reality (caloric recipes and dishes with few bioactive nutrients), Determination of key points (sodium, trans fat, simple sugar), Theorisation (technical explanation on healthy substitutions), hypotheses and the practical application to reality (suggestions and tasting of recipes) (Table 1). With this method it was possible to present the group with the "principal points" and thus the solution to the less healthy foods, initially, proposed by people with diabetics (Santos et al., 2023).

In the first stage of the application of the Maguerez arc with a verification of the reality of people with diabetic in the workshops was performed. Difficulties, failures, contradictions, discrepancies, conflicts, excess fat, portion or seasoning and others were identified. The second stage of the arc involved aspects of the problem, *i.e.*, the "key points" to be modified. Participants reported that they prepared the recipes based on information "from memory" and that in general the quantities served were always similar. The third step of the Maguerez arc was theorisation. During the workshops, knowledge was sought about the importance of soluble fibres, dark green vegetables, natural spices, red fruits, and other foods that are more suitable for people with diabetics. In parallel, technical and nutritional information was provided to the participants. The importance of the dissemination of technical knowledge was evident among people with diabetics, since a standardised production of better quality food/recipes began to occur. In the fourth stage, hypotheses were established to solve the problems and questions, such as taste, colour, visual of the food, smell and other aspects, which were raised by people with diabetics. And in the fifth stage of the Maguerez arc, there was the practical application to reality, in which the recipes were prepared, evaluated and tasted. Everything was done under the guidance of how to proceed during production so that the sensory aspects were close to the food that was adapted to the most suitable recipe for people with diabetics. After tasting the dishes, an evaluation of the results was made and the volunteers reported that the foods were easy to prepare, low cost, that the written recipe made it easier to buy the ingredients, increased the options for alternative products and decreased food waste. The people with diabetics also reported what they learned about the diversity of foods and menu options, a fact that provided a healthier diet and consequent improvement in the satisfaction of the participants and their families. The central ideas developed in the cooking workshops, with the voluntary participation of people with diabetes, are described in Table 2 (Santos et al., 2023).



Table 2: Central ideas applied during the cookery workshops and responses observed through the voluntary participation of adults with diabetes

Central ideas	Reports from diabetics during the cooking workshops
Understanding the importance of food	<i>It profoundly changed my view of working with nutrition.</i>
What is healthy eating? Do I know how to prepare healthy food?	<i>The workshops guided me on the preparation of more nutritious recipes and with foods that lowered my blood glucose.</i>
My experiences with food and diabetes	<i>I learned to write down the recipes and observe the level of my glucose.</i>
Did I start preparing food with the modifications in my home?	<i>I had difficulty because it was the first time I made these preparations, but then I got used to changing everything in my house.</i>
I learned the importance of reflecting on learning.	<i>The instructions were a basis for me.</i>
Have I learned to consume more vegetables and fruits?	<i>I had little creativity. However I realized that it is easier to change the recipes and vary the menus of my home and be praised by my children. Before I made different food for those who had diabetes and another less varied for their children. Now, I vary the menus more and everyone in the family can eat the same food.</i>
I kept a diary of my food in my daily life.	<i>I enjoyed cooking so much that now I dedicate little time to do other things. Before I spent all day in front of the television or sleeping. Now, I plan my recipes every week, write down everything they liked,. And, I write down everything I do that made me feel good.</i>
What was your assessment and feelings when participating in the cooking workshops?	<i>I have a feeling of joy, new friendships and adjustments of recipes. It was a lot of emotion. I was proud of myself.</i>

Source: Santos et al., 2023.

Through the cooking workshops were generated a social, humanistic and cultural behaviors in people with diabetics, which contribute to reduce the economic impacts caused by diabetes. In the last cooking workshops diabetics reported a decrease in spending on food and treatments involving hospitals and laboratory tests of higher cost.

4 DISCUSSION

The methodology chosen was problematization with Maquerez arc, centered on the reflection of daily life, where was produced workshop. Then, they are products of interaction with the group and constitute discursive practices based on the invitation made by the researcher. Workshop stimulates a process of deconstruction of this daily life and seeks new and different knowledge that will compose and enable the construction of a new day-to-day life, which is dynamic and provisional. This model of learning allows the person to develop skills of observation, analysis, evaluation, cooperation among group members and overcoming some internal conflicts (Diez-Garcia et al., 2011; Soares et al., 2023). Aspects such as difficulties, contradictions, discrepancies, conflicts, excess fat, portion or seasoning and others observed in the first stage of Maguerez arc can be configured as problems (Diez-Garcia et al., 2011).

A "principal point" observed in the second stage of the Maquerez arc was the fact that diabetics prepared recipes based on "memory" information (Daniels et al., 2012; Soares et al., 2023). An



important point is the standardisation of preparations to make them more nutritious (Daniels et al., 2012; Evert et al., 2019). The production of standardised recipes also improved the control of purchases, inventory, estimation of the cost of preparation, calculation of the value of the product and reduction of unnecessary expenses (Daniels et al., 2012; Mazzonetto, Dean, Fiates, 2020; Soares et al., 2023). In this context, it is possible to infer that cooking workshops represent a low cost potential tool to control the level of sugar in the blood, reduce the use of medicines and to prevent complications of diabetes (Santos et al., 2023).

Evert et al. (2019) established that the improvement of diabetes control can lead to a 30% reduction in the incidence of complications, resulting in potential cost savings related to hospitalizations, medications and treatments. And Pititto et al., (2019) reported that in 2014 the cost of hospitalizations due to diabetes and correlated conditions for the Brazilian Unified Health System (SUS) reached US\$95.005.375,00. Based on Evert et al. (2019) with appropriate diet and lifestyle this value would fall to US\$66,503,762.51. That is, a saving of US\$28,501,612.00. Assuming that this value is will be maintained in the period from 2024 to 2034, Brazilian Public Health Care System and society would achieve savings of US\$285,016,125.00 (Santos et al., 2023). These data reinforce the need to invest in health resources focused on the primary prevention of diabetes and its complications (Lavelle et al, 2026).

Spink et al, (2014) reported that all the practical workshops promote reflections on everyday life and the Maguerez arc methodology proved to be an efficient tool for exposing the participants' main difficulties. These facts were observed in the cookery workshops which represented a strategy to reduce the risk of complications and helped diabetics to appreciate the importance of health care even more (Table 1 and Table 2) (Santos et al., 2023). The data of these Tables are in agreement with Oliveira and Castro, (2022), where the established model should contribute to the development of actions to promote healthy eating in the daily lives of families.

The main role of the cookery workshops was to provide an experience of reflection, motivation and understanding on the relationship between the act of eating and cultural, environmental, affective and health relationships, that is, to focus on food and all that it means, rather than focusing only on the nutritional characteristics of food. The observed results are in agreement with published reports who considers cognitive, practical, affective, and emotional factors as the major motivators to home meal preparation (Evert et al.; 2019; Mazzonettoet al., 2020; Askari et al., 2020; Pagliai et al., 2021; Oliveira, Castro; 2022). So, cooking can be considered an effective "form of language and communication", it has been used as a strategy to promote adequate and healthy eating, tending to reduce the choice of processed and ultra-processed foods, which are associated with the development of obesity, cancer and other chronic diseases (Lavelle et al., 2016; Mazzonettoet al., 2020; Askari et al., 2020; Pagliai et al., 2021; Oliveira, Castro; 2022).



The treatment of the person with diabetes is considered complex, requires pharmacological treatment and non-pharmacological treatment (changes in lifestyle, healthy eating and physical activity (Campos et al., 2020; Askari et al., 2020; Pagliai et al., 2021). Patient support and continuing education by the health team and family members are fundamental (Rosenberg, 2022; IDF; 2022). The prevention of morbidities through viable and feasible strategies to control the incidence and complications of diabetes has become the main focus (Table 1 and Table 2). Thus, encouraging self-care in health causes a direct reduction in the costs of hospitalizations. Therefore, it is important that people with diabetics make adequate food planning and seek to know their needs and limitations, to prevent hospital readmissions (Harrison et al., 2014; Zurlo, Zuliani; 2018; Borges et al., 2023).

The results observed in the cooking workshops by Santos et al., (2023), corroborate with Mendonça et al (2022), who reported that the realization of training workshops contribute to the promotion of knowledge centered on the care of the person with diabetes, risk factors and prevention of health damage resulting from this disease. During the cooking workshops, the participants' usual way of eating was encouraged, but with the use of recipes adapted and healthier for their situation, always respecting the dietary preferences of each individual. Several of these recipes are available for free in the UFOP Repository (RIUFOP, 2017). The activities of cooking workshops contributed to people with diabetics making correct food choices, adopting a nutritionally adequate diet and improving their lifestyle, especially among their families (Santos et al., 2023). The costs of diabetes depend on the duration of the disease, the level of care and the presence of chronic complications. These factors suggest the need for reallocation of health resources focusing on the primary prevention of diabetes and its complications.

5 FINAL CONSIDERATIONS

Based on the aspects observed, it was concluded that cooking workshops valuing regional knowledge and flavors constituted an effective strategy for food and nutritional education of people with diabetics. Through the problematization with the arch of Maguerez it was possible to analyze problems of execution of the preparations and to propose ideas of tasty and healthier recipes for people with diabetics. The method provided people with diabetics with new skills and competencies in the preparation of foods and menu options suitable for a healthier diet, improved sociability and coexistence with their families, and is low cost.



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