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Evaluation of the intervention "Bom Dia", in Recife - Pernambuco-Brazil in the control of childhood obesity

Abstract

Childhood obesity has been increased sharply in Brazil and worldwide, becoming a major public health problem. This study aims to evaluate the "Bom Dia" program (a multidisciplinary program to care of obese children) in Recife, Pernambuco, Brazil, according to the reach, effectiveness, adoption, implementation, and maintenance using the RE-AIM model. In this study, mixed methods were used to collect data, with triangulation of methods, documentation research, directed observation, field journal, questionnaire, and semi-structured interviews, conducted from February to December 2020. This program had a 0.95% reach at community level. Some barriers such as: inflexibility of the program schedule, poor economic conditions, access difficulties, and weak integration in Health Care Network, made in difficult to reach the target population. The program presented "adoption" by all members of the multi professional team. The intervention was successfully implemented, although some adjustments to of the logic model were required over time. "Bom Dia" has been maintained at the organizational level over the years, due to the performance of the intervention team and the support from the health organizations. Finally, despite the "reach" to the target audience had not achieved expressive results, this study is unpublished, and the intervention can promote improvements in the quality of life of obese children and adolescents. Therefore, the results of this study are important for practice and could support the implementation of similar intervention programs to control obesity in children.

Keywords: pediatric obesity, intervention studies, outcome and process assessment, health care, implementation science

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Background

Childhood obesity is considered a serious public health problem worldwide.[1] According to the World Health Organization (WHO), 40 million children under 5 years of age are obese and 340 million children and adolescents between the ages of 5 and 19 years have a nutritional status of overweight or obese in the world.[2] The prevalence of overweight it is also worrisome in Brazil. Studies by the Food and Nutrition Surveillance System of the Brazilian population show that are overweight and/or obese, in female 27.13% of children (5 to 10 years) and 27.7% of adolescents (11 to 19 years), and in male, 29.3% of children (5 to 10 years) and 25% of adolescents (11 to 19 years) are overweight and obese.[2] If this situation is not brought under control by the year 2030, Brazil will occupy the 5th place in the ranking of countries with the highest number of obese children and adolescents.[3] Statistics show that in Pernambuco (PE), 18.5% of children between the age of 5 and 10 years are overweight and 14% are obese; among adolescents between 11 and 19 years old, 22.1% are overweight and 15.8% are obese.[2]

Obesity is characterized by excess body fat determined by the body mass index (BMI) appropriate for the individual's age.[4] This complex nutritional condition, in addition to harming the child's physical, emotional and social health, increases the risk of developing other chronic diseases in adulthood.[5] Behavior and environmental circumstances are the main factors of overweight and obesity in children and adolescents, with consequent damage to health and quality of life.[6,7]

Considering this problem, in 2016, the World Health Organization's report of the Commission to End Childhood Obesity calls for the implementation of an integrated package of lifelong recommendations to provide obesity prevention and control services. Among the recommended interventions, the implementation of interventions that promote the practice of physical activities and reduce sedentary behavior in children and adolescents is established.[8]

In this sense, efforts have been made to develop policies and strategies that can have a positive impact on this scenario.[9–11] With the aim of promoting health, preventing risk factors for the occurrence of Chronic Non-Communicable Diseases and improving the quality of life of children and adolescents in Recife, the Bom Dia (Multiprofessional Program for the Care of Obese Patients) was created, an intervention designed to help children and adolescents control overweight and obesity.

Given the importance of this issue and this intervention, it is necessary to deepen the scientific knowledge that will allow improving programs to combat childhood obesity in Brazil. In addition, it is necessary to conduct evaluations that help in the planning and management of interventions that increase the impact of these interventions on public health.[12]

Many studies in the field of evaluation take a dynamic approach to the analysis of interventions. In this context, the RE-AIM stands out, an evaluation tool developed by Glasgow and collaborators provides important information on the dissemination, implementation, and/or adaptation of health research programs. This tool uses five (5) dimensions, namely: Reach, effectiveness, adoption, implementation, and Maintanance.[13]

The RE-AIM model uses different approaches (quantitative and qualitative) to assess different levels of action employed in the

implementation of a program, assuming that the users of a program are not solely responsible for its results. And, thus, it seeks to evaluate on a scientific basis the implementation of a planned program, not limited to studying the results related to the effectiveness of the program.[14,15]

The present study aims to answer the question of how the Bom Dia intervention program to combat childhood obesity was operationalized in Recife-Pernambuco-Brazil, in terms of the reach of the program's users, team adoption, intervention effectiveness, fidelity in implementation, and intervention sustainability over the time.

Methods

The study was developed in collaboration with the Bom Dia Program (Multi professional Program for the Care of Obese Children) offered by the Senador José Ermírio de Moraes Medical Center (CMEM), an outpatient clinic located in the Sanitary District III of Recife, under the direction of the Municipal Health Department of that city. CMEM was launched in 2004 to improve the quality of life for adults and elderly. In 2015, it was expanded with an outpatient clinic to treat childhood obesity.

The selection of participants for this study was intentional, based on the desire to ensure the diversification of actors, between health professionals and the coordinating team. For this, the research team members were previously involved with specific stakeholders, from all categories, with three types of participants: (1) professionals from the "Bom Dia" Program (physical educator, pediatric endocrinologist, nutritionist, psychologist, social worker, nurse and physical therapist); (2) CMEM coordinators; and (3) parents/guardians of Program users (in order to assess the effectiveness of the program), who had been participating in the Program's activities for at least 6 months and who expressed interest in participating in the study by signing the informed consent form .

Data were collected from February to December 2020. Triangulation of methods was used as data collection and analysis strategies according to the five dimensions of the RE-AIM model,[16,17] through documentary research (analysis of census documents from the Brazilian Institute of Geography and Statistics (IBGE) and Program's normative instructions); directed observation; field diary; questionnaire, and semi-structured interviews with the participants.

To calculate the proportion of children and adolescents scheduled for treatment at the CMEM, from 2016 to 2020, we estimated the population of children/adolescents, aged 5 to 14 years, residing in Recife-PE, using data from the 2020 IBGE Census; and the number of children/adolescents referred by the basic health units of Recife-PE for consultation with the pediatric endocrinologist of the CMEM was obtained from the SISREG (Consultation Regulation System).

Information on the implementation protocol for the "Bom Dia" program (participation criteria, inputs, activities and proposed programming used in the program description) were obtained from the Program's normative instructions. In addition, for the calculation of the professional adoption rate in the Program, documents made available by the Administrative Secretariat of the CMEM on the number of professionals who regularly interact with the service were used. And, to calculate the individual dropout rate, we used documents made available by the "Bom Dia" Secretariat about dropout from the program between 2016 and 2020.

Clinical and metabolic data, as well as the nutritional status of Program users (fasting blood glucose, total cholesterol, triglycerides, TGP, body weight and BMI), performed routinely as part of their monitoring, were obtained from their medical records.

To assess the relationship between the "effectiveness" of the program measures, the data were divided into two time points: at the first time point, during enrollment in the program, and at the second time point, after six months of follow-up. It is important to emphasize that the choice of six months for the cut of the effectiveness evaluation, in contrast to the period of 4 years of operation of the program to evaluate the other dimensions in this study, was due to the lack of accurate records of the users of the program when over time Finally, information about the program site, physical structure, and intervention characteristics was obtained from official CMEM documents through the site's physical plant.

The directed observation was systematized in eight site visits, in addition to the preparation of a field diary, which was used as a quantitative and qualitative tool to assess the implementation of the intervention, evaluate the adaptations, and describe the main obstacles and potentials found in the process of organizational implementation and maintenance.

The evaluation script includes open and closed questions to underpin the work strategies implemented in the Bom Dia, such as: Day of the week, time of day, activity developed, participation, analysis of the environment, practices of the intervention professionals and the participation of the users. In this way, it was also possible to evaluate the implementation elements in terms of fidelity and adaptation of the intervention; verification of the objectives of the meeting (whether they were achieved) and the impressions of the observers responsible for the children and the impressions of the intervention professionals during the activities carried out.

Those responsible for the users of the program in this study answered a semi-structured questionnaire containing closed questions on: place of residence, age, gender, family income, and education of the person responsible) to assess the sociodemographic profile of the program users; self-perception of improvement in quality of life (through the following question: "In general, do you consider that the child's quality of life has improved, worsened, or remained the same after entering the program?"); open-ended questions about the program (reason for entry, type of knowledge); frequency of physical activity outside the program (by asking the following question, "Does the child engage in physical activities outside of school? If yes, which ones?"); and frequency of participation in the program to help assess "reach" and "effectiveness." It is worth noting that the questionnaires were completed by the respondents with the help of the study researcher, shortly after the objectives and methods of the research were explained, and with the signature of the consent form, conducted individually at the CMEM premises while waiting for the children/adolescents.

The semi-structured interview script was used to allow the person responsible for the study participant greater flexibility in the use of the instrument, allowing for deeper access to information in addition to comparing the viewpoints of program participants.[17] The central questions of the semi-structured script guided the assessment of each dimension proposed by the RE-AIM method. For professionals and program coordinators, the script included questions about "adoption," "implementation," and "maintenance," as well as specific questions about how the program was "presented" to program participants. search; on the barriers and potential for program implementation and sustainability; and on other adjustments that have been made since the program's inception. In addition, the interviews with intervention professionals included questions about "exiting the program."

A total of 17 interviews were conducted using a semi-structured script, including two with coordinators, nine with professionals who work or have worked in the program since its implementation; and

six with parents/guardians of program participants. Interviews were conducted individually, lasted approximately 30 minutes, were recorded, and later transcribed. All interviews took place in a protected environment and individually, and the identity of each participant was preserved (in this study, team professionals were referred to as "P," coordinators were referred to as "C," and managers were referred to as "R," followed by an interview sequence number).

The systematic approach to conducting the evaluation, presented in Table 1, describes the operationalization of the structure RE-AIM and includes the following information: the dimensions assessed, the variables used, guiding questions for data collection, the data sources, and the method of operationalization for the evaluation. The study followed all ethical principles (CAAE nº.07609519.5.0000.5190).

Table 1 Systematics for conducting the evaluation, according to the five dimensions of the RE-AIM

Dimension	Variable	Northing questions for data collection	Data source	Operationalization
Alcance	It is the number of users who pass through the Program, the proportion of the population participating, and the representativeness of the users of the program in relation to the eligible population.			
	R1. Description of the target population.	R.1.1. What is the number of active users registered in the program?	R.1.1. Documentary research in the Program.	R.1.1. The number of active program users was obtained through the registration form contained in the Program files (n=6).
		R.1.2. How do you identify the target population of the program?	R.1.2. Interview with professionals and coordinators of the Program (Apendices E-F) and documentary research in the program's regulations.	R.1.2. To identify the target population, interviews were conducted with professionals and coordinators who work directly in the Program to find out who the Program is directed to and how the target population is identified through program normative data.
		R.1.3. What are the characteristics (sociodemographic, clinical, anthropometric and lifestyle profile) of the program population?	R.1.3. Questionnaire applied to parents/guardians of children/ adolescents.	R.1.3. To measure the characteristics of the target population, a questionnaire was applied (Appendix D), to the parents/ guardians of active users of the Program (n = 6), using the following sociodemographic variables: gender, age, education of guardians (years of study); economic data: family income per capita; health conditions and quality of life; reported morbidity, use of medications, perception and satisfaction with health and perception of quality of life.
	R.2. Participation fee.	R.2.1. How many are eligible for the Program?	R.2. Documentary research through data from the Central Consultation Regulation of the Municipality of Recife (those eligible for Good Morning) and data from the individual registration form of users, available in the PAC hub (data of those who started the Program).	R.2. To measure the participation rate in the Program, the number of eligible people who started the Program in the period 2016 to 2020 (n = 35) was divided by the number of the eligible population of the CMEM (n = 3,969) in that same period.
		R.2.2. How many of the eligible people participate in the Program?		
	R.3. Factors that negatively influenced reach.	A.3. What are the main barriers to achieving the Program?	R.3. Interview applied to professionals and coordinators of the intervention.	R.3. The data were obtained through a guide questionnaire for semi-structured interviews (Appendix E-F), applied to professionals working in the intervention and with the program coordinators (n = 17).

Dimension	Variable	Northing questions for data collection	Data source	Operationalization
EFFECTIVENESS	It is related to how much the Program causes changes in health outcomes and quality of life of users of the program.			
	E.3. Individual abandonment rate.	E.3.1. How many eligible people started the Program?	E.3.1. / E.3.2. Documentary research through the individual registration ofthe eligible people who started the Program, available at the Program's Administrative Secretariat.	E.3.1. / E.3.2. Calculation of the Abandonment Rate: p calculatesthe rate, divides the number of users who started the Program and gave up in the period between 2016 and 2020 by the number of eligible who started the Program and remain active and multiplied by 100.
		E.3.2. How many Program users have given up?		

Table Continued...

Dimension	Variable	Northing questions for data collection	Data source	Operationalization
		E.3.3. What are the main reasons for abandoning the intervention?	E.3.3. Interviews with program participants (professionals and coordinators).	E.3.3. For the survey of qualitative data related to abandonment, interviews were conducted with the main participants of the program who work in the activities, thus obtaining information about the main reasons that may lead to abandonment.
ADOPTION	The proportion and representativeness of the place and eligible higher education professionals who are willing to implement the Program.			
	A.1. Description of the location that adopted the Program.	A.1. What are the characteristics of the place that adopted the Program (characteristics of the neighborhood, the population served, etc.)?	A.1.1 Cmem institutional documents and data from the Recife Municipal Plan (PMR), 2018-2021.	A.1.1 The data were collected in documents of the institution, provided by the CMEM coordinator. Physical data were obtained from the site, population detailing. Data on geographic coverage were taken from the PMR 2018-2021 available on the Recife City Hall website.
			A.1.2 Field diary.	A.1.2 to complement the data on the physical characteristics of the Program site, eight field visits were made and the data were recorded in the field diary.
	A.2. Participation rate of intervention professionals.	A.2.1. How many professionals are eligible to work in the intervention? A.2.2. How many professionals agreed to participate in the intervention?	A.2. Semi-structured interviews with CMEM and CAP coordinator (n=2).	A.2. To calculate the participation rate in the Program, the number of participants in the Bom Dia Program team (n=10) was divided by the number of professionals-eligible for the Program (n=10), multiplied by 100.

Dimension	Variable	Northing questions for data collection	Data source	Operationalization
ADOPTION	The proportion and representativeness of the place and eligible higher education professionals who are willing to implement the Program.			
	A.3. Characteristic of intervention professionals.	A.3. Professional training and bonding in the Program: What is your professional training? When did you start working on the program? What is the highest level of training of professionals in the Program? How are the professionals who work in the Program hired (employment) ? Who pays them? How much time does each professional, in hours, spend on the Program? Were the program professionals trained to act in the function? Do professionals participate in training (continuing education, courses, lectures, etc.)? If so, what do they consist of? Who are they offered by?	A.3. Semi-structured interview with professionals and coordinators of the intervention (Appendices E-F).	A.3. To obtain the data that determine the characteristics of the team, semi-structured interviews (Appendices E-F) were conducted with professionals and coordinators (n=11). The distribution, according to the area of activity, the time spent in hours per week in the Program was quantified, and source of income. Issues related to the time of action in the Program, and the positive points and limitations on the adoption of the intervention were also raised. All interviews were recorded and transcribed, later grouped the answers in their encoders.
Implementation	The extent to which actions are being put into practice as intended in the Program.			
	I.1. Structure and characteristic of the Program.	I.1.1 Relationship between productions, proposed activities and goals?	I.1. Documentary research through] the normative components of the Bom Dia program.	I.1. It was obtained through observation guided by a script (Appendix C) at the moments of the actions and information contained in the program regulations, to detail the structure of the Program (number, frequency, duration of contact), and the proposals and goals of the activities.
		I.1.2 What are the characteristics of the Program's activities?	I.1. Targeted observation.	

Dimension	Variable	Northing questions for data collection	Data Source	Operationalization
Implementation	The extent to which actions are being put into practice as intended in the Program.			
	I.2. Consistency of delivery.	I.2.1. How often do program meetings?	I.2.1. / I.2.2. Targeted observation.	I.2.1. / I.2.2. Detailed reports on the development of the proposed activities, completed through a checklist (Appendix C).
		I.2.2. How long and during what period are each meeting held?		
		I.2.3. How are activities delivered?	I.2.3. Field diary.	I.2.3 A field diary was used as a qualitative instrument to describe the main activities developed in the meetings, starting with obtaining contact with the guardians of the children who were in the waiting room, and then observing the activities.
	I.3. Compliance with the planning between site and intervention team.	I.3.1. Are the activities as planned?	I.3.1. / I.3.2. / I.3.5. / I.3.6. Targeted observation.	I.3.1. / I.3.2. / I.3.5. / I.3.6. The data were obtained after observation during the meetings, and detailed reports on the changes in the proposed activities were completed in the field diary. During the meetings, the adaptations were recorded, with the Program project as the basis.
		· I.3.2. Has there been a change in the implementation process of the Program?		
		· I.3.3. What reasons led to the adaptations of the protocol for implementing the intervention?	I.3.3. / I.3.4. / I.3.5. Interviews with intervention professionals.	I.3.3/I.3.4/I.3.5. Semi-structured interview with intervention professionals (Appendix E) to obtain data on compliance with the plan and what reasons for adaptations over time. All interviews were recorded and transcribed, later grouped the answers in their encoders.
		· I.3.4. Did the site have to adapt to the program's activities?		
		· I.3.5. Are program activities carried out by the professional team according to the planning?		
		What factors influence planning compliance?		
		I-I- I.. 3.6. Can the intervention professionals carry out the proposed activities without difficulties?		

Dimension	Variable	Northing questions for data collection	Data source	Operationalization
Implementation	The extent to which actions are being put into practice as intended in the Program.			
	I.4. Barriers and potentialities of the implementation process.	I.4.1. What factors have helped in the implementation of the Program?		I.4. It was obtained through semi-structured interviews with coordinator and program professionals (Appendices E, F), with the objective of verifying the challenges and successes for the implementation of the Program. Thus, all interviews took place in a reserved environment and individually, and the identity of each participant was preserved (in this study each person team member received the designation of "P" followed by a number and the coordinators received "C" followed by a number). All interviews were recorded and transcribed, later grouped the answers in their encoders.
		I.4.2. What factors made the implementation of the Program difficult?	I.4. Interview with coordinator and intervention professionals (n=11).	
Maintenance	It is the maintenance of the Program after adoption and implementation.			
	M.1. Organizational maintenance.	M. 1. How was the Program integrated into the municipal health system?	M.1. Interview with cmem and cap coordinator (n=2).	M.1. It was obtained through semi-structured interviews with coordinators of the CAP and CMEM (Appendix F), with the objective of verifying the extent to which the Program becomes part of the municipal health system, regardless of political changes. All interviews were recorded and transcribed, later grouped the answers in their encoders.
	M.2 Barreiras and potentialities for the continuity of the intervention.	M.2.1. What are the barriers to intervention remain at the organizational level over time?	M.2.1/M.2.2 Interview with CMEM and CAP coordinator (n=2).	M.2. It was obtained through semi-structured interviews with CAP and CMEM coordinators (Appendix F), with questions related to influencing factors for continuity of intervention. All interviews were recorded and transcribed, later grouped the answers in their encoders.
		M.2.2 What are the main potentials for maintenance at the organizational level of Bom Dia?		

Source: Prepared by the author (2021).

Citation: Maria SAC, Brito SF, Ribeiro VAL, et al. Evaluation of the intervention "Bom Dia", in Recife - Pernambuco-Brazil in the control of childhood obesity. *Int J Fam Commun Med.* 2022;6(4):165–174. DOI: 10.15406/ijfcm.2022.06.00283

Table 2 Clinical characteristics of users of the Bom Dia program (profile of biochemical tests and anthropometry) at admission to Bom Dia (Moment 1) and after 6 months of follow-up (Moment 2)

Momento 1 (n = 6)								Momento 2 (n = 6)						
Variables	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**Average**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**Average**
Biochemical tests (mg/dL)														
Col.T	181	182	160	170	155	176	170,6	160	154	125	173	132	184	154
Trig.	156	137	90	112	113	144	125,3	124	102	83	122	104	111	107,6
TGP	14	11	16	17	15	22	15,8	12	13	12	14	13	20	14
Glic. J	91	83	87	95	88	94	89,6	88	84	90	85	81	92	86,6
Anthropometric data														
Peso (kg)	83,1	40,7	40,3	42,2	44,5	47,5	49,7	78	39,4	45,6	48,7	48,5	55,3	52,8
IMC (kg/m²)	33,2	25,4	22,4	22,2	22,4	29,9	25,9	31,2	23,7	23,2	21,4	22,1	29,5	25,1

Legenda: Col. t = total cholesterol < 150mg/dl; trig. = triglycerides <100 mg/dl; tgp = pyruvic transaminase < 40 mg/dl; glyc. j = fasting blood glucose < 100mg/dl – these are the reference values in children and adolescents according to the childhood obesity control manual (ms, 2018) –; weight = body mass in kilograms (kg); icm = body mass index (kg = kilograms; /m² = meters squared); cm = centimeters.

Results

Reach

The target population included children registered in the CMEM endocrinology outpatient clinic from 5 years of age, both sexes, diagnosed overweight or obese. Eligible individuals come to CMEM through Family Health Strategy (FHS) referrals from the borough's twelve health districts. Consultations take place at CMEM with nutritionists and endocrinologists who offer enrollment in the Bom Dia program as part of treatment to control overweight and obesity.

To calculate the scope of the program, some data and criteria had to be established: the estimated target population, the estimated number of people exposed to recruitment, the actual number of people responding to recruitment, the actual number of people eligible for the program, and the actual number of people participating in the program.

Based on data from the Recife Consultation Regulation System, between 2016 and 2020, 6,161 children and adolescents between the ages of 5 and 14 were referred to CMEM for consultation with a pediatric endocrinologist, an average of 102 children/adolescents were referred per month, or 25 per week. According to the information collected, 60% of the consultations involved overweight or obese children and adolescents, meaning that 3,696 children and adolescents were eligible during the study period. On the other hand, only 35 of the eligible children and adolescents accepted enrollment for obesity treatment and control during this period. From these data, the estimated reach rate (TA) of the Bom dia program can be calculated, as shown in Figure 1.

Because of the very low intervention reach of the program analyzed in this study (0.95%), we sought to identify barriers that influenced Bom dia reach in the target population. Based on these data, the following barriers were identified: lack of flexibility in allocating time for the intervention, difficult access, low economic conditions, and the weakness of the program's connection with the other points of the RAS, and especially with the other institutions that integrate primary care, such as the Family Health Unit (USF) and the Academia da Saúde poles. And the opportunities: Program design and multidisciplinary screening.

Effectiveness

Program users showed clinical differences in key biochemical biomarkers (total cholesterol, triglycerides, TGP, fasting glucose) and anthropometric data (body weight and BMI) when comparing different time points of follow-up, at enrollment in Bom Dia (time point 1) and after 6 months of follow-up (time point 2), as shown in Table 1, with no statistical differences ($p > 0.05$).

In addition to trends in biomarker scores, there is also evidence of perceived benefits, as shown in the speech extracts:

"We have been noticing that he is more active, he can run, jump rope, he even calls his cousins to play on the street on a bicycle, which before he just wanted to be playing on his cell phone..." (R3).

"With the Program she is interacting more with the children here, I think she didn't like to play with the street girls with shame, now she plays with them more, I think it was after she started with her friends from the Good morning" (R5).

According to program user leaders, these benefits were essential to motivate those responsible and users to stay in the program, and all agreed on the positive perception of users' quality of life after starting activities in the offered program.

However, the dropout rate of the intervention was 80%. Between 2016 and 2020, 35 children and adolescents began the program, but during the data collection period for this study, only six (06) active users participated in the program. The main reason for dropping out was the poor economic situation of the families of the program participants, which made it difficult to get to the program, and the fact that the intervention only took place during a single shift that coincided with the children and adolescents' school hours.

Adoption

The Bom Dia program in 2020 consisted of a multidisciplinary team with 10 members distributed as follows: Physical Educator (n=3), Nutritionist (n=1), Nurse (n=1), Physical Therapist (n =1), Psychologist (n=1), Social Worker (n=1), Pediatric Endocrinologist (n=1), and Coordinator (n =1), as shown in Figure 2. However, it is worth noting that CMEM has an appropriate multidisciplinary team: Nutritionist (n=3), Nurse (n =6), Physical Therapist (n =1), Psychologist (n=2), Social Worker (n=2), and Pediatric Endocrinologist (n=1) and Coordinator (n=1), for a total of 16 eligible higher education professionals. On the website PAC, the team includes: physical educators (n=3) and coordinator (n=1) eligible for the intervention. It should be noted that after the presentation of the proposal for the Bom Dia program and the need to assemble the team required to implement the intervention, 6 professionals from CMEM and 4 professionals from PAC joined the program. Thus, 50% of the eligible team members formed the Bom Dia program, as shown in Figure 2.

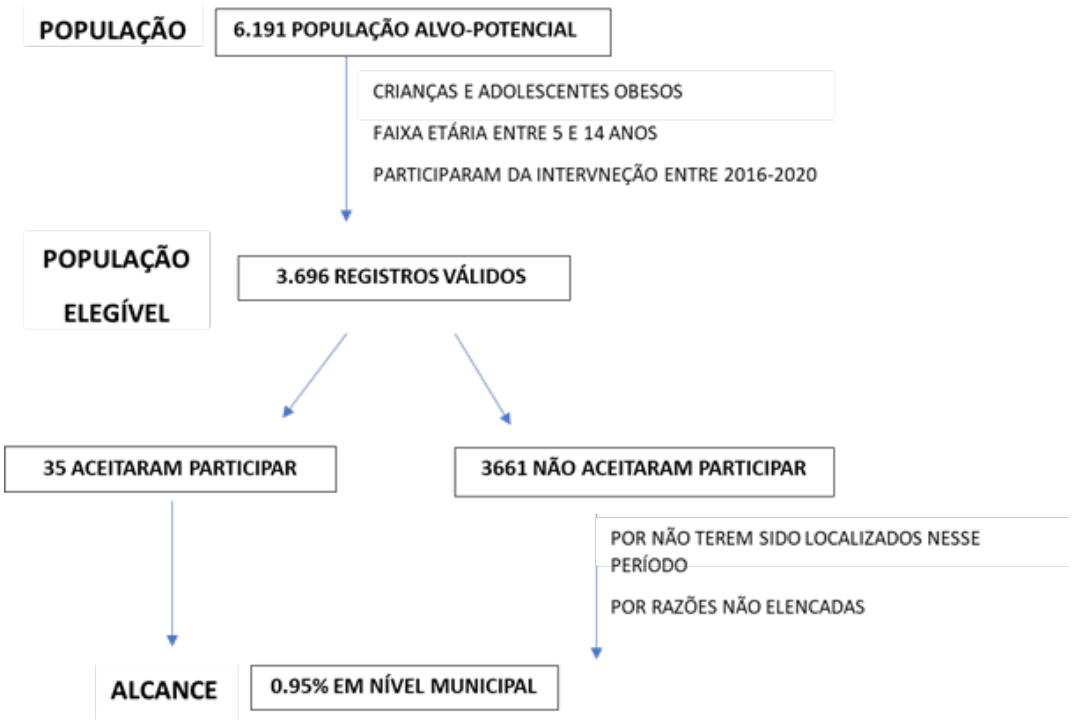

Figure 1 Flowchart of the estimation of the reach of children and adolescents with obesity eligible to participate in the intervention project of the Bom Dia program, Recife-PE at the municipal level.

Source: Prepared by the author (2022).

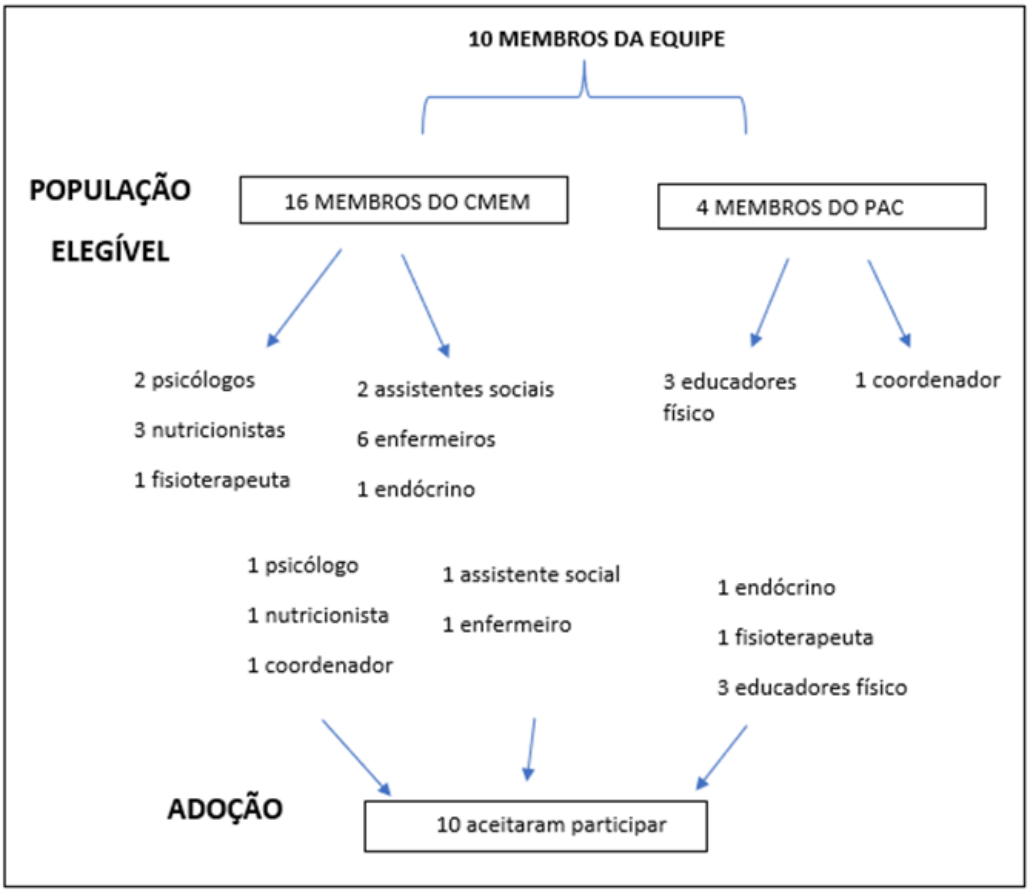

Figure 2 Flowchart of the Adoption of the team working in Bom Dia.

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All the professionals of the intervention are public servants working in the Recife City Hall. Among them, a general coordinator, three professionals with a degree in physical education and a physiotherapist are exclusively involved in the organization and activities of the Bom Dia program. The other professionals, including a pediatric endocrinologist, a nurse, a social worker, a psychologist and a nutritionist, are partners of the program. They work in the areas of physical exercises and physical activities, production of care and healthy lifestyles, promotion of healthy nutrition, artistic and cultural practices, health education, and planning and management of the activities of the intervention program.

Physical education specialists, who are among Bom Dia's key staff, have been assigned to PAC and have been selected to work exclusively in the administration of the intervention at the CMEM pole. They are permanent civil servants of the municipality and work 30 hours per week exclusively for the activities of the program. The other team members are also permanent civil servants of the CMEM with a 30-hour workweek, with part of the workload reserved for collaboration and support in the development of the program. It should be noted that these professionals have been instrumental in supporting the development of the intervention, as stakeholders showed interest and considered the proposal of the program important for the control of childhood and adolescent obesity.

Implementation

To show the existing relationships between the inputs, the proposed activities, the objectives to be achieved and the expected results, Figure 3 presents the structural model of Bom Dia to combat childhood obesity. Over the years, the program has changed (mainly in terms of the number of program participants and activities implemented). In its current form, the program consists of a team of six (6) multi-professionals, four (4) exclusive intervention professionals and five (5) partner professionals.

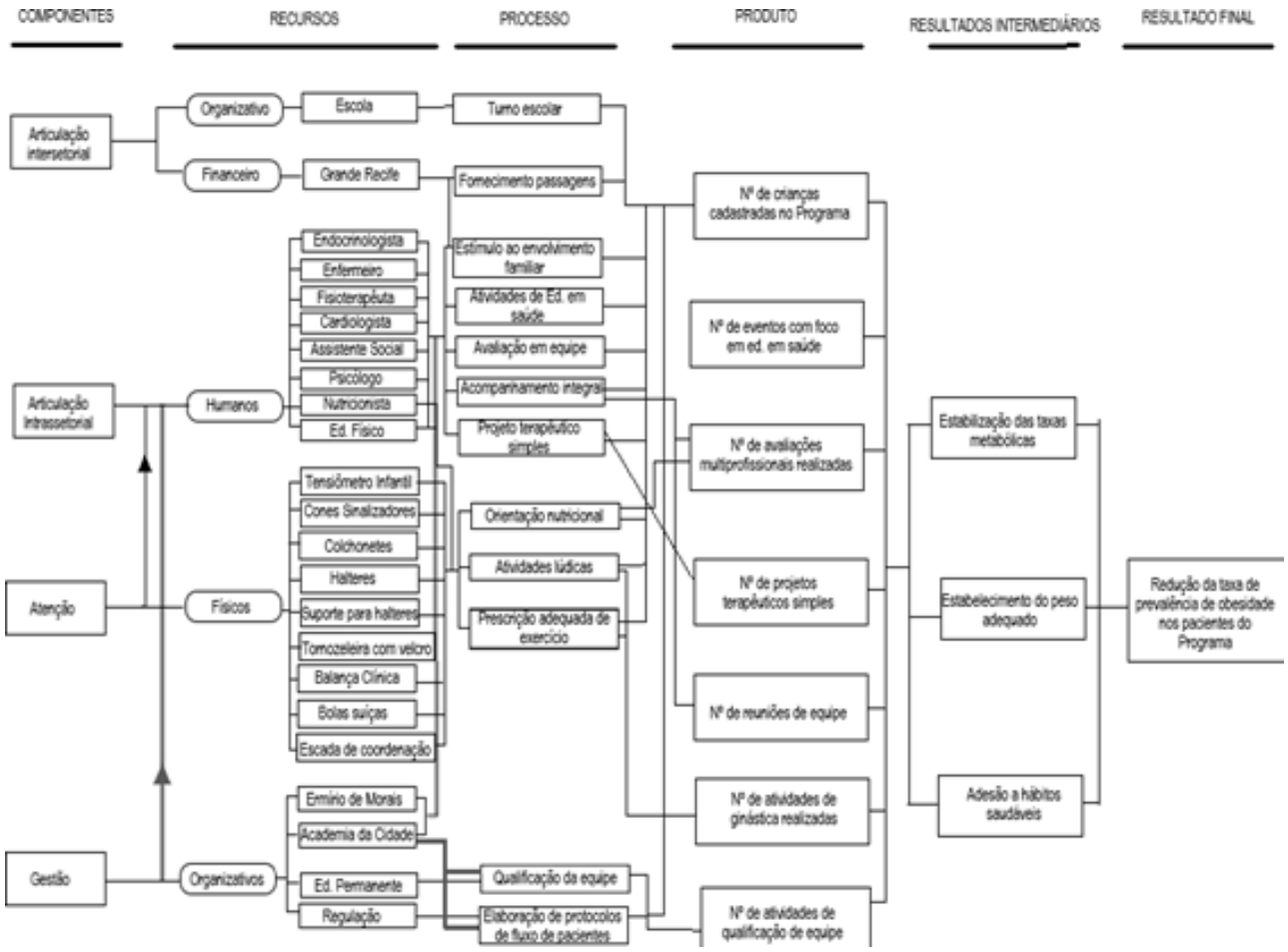

Figure 3 Structural model of Bom Dia, Recife, 2020.

Bom Dia meetings are scheduled by a multidisciplinary team and occur three times a week in a PAC hub within CMEM and last between 1:30 and 2 hours (Table 2). The multidisciplinary team, as described in Section 5.3.2, consists of a pediatric endocrinologist, nurse, physical educator, psychologist, nutritionist, social worker, and physical therapist. Initial individual assessments of program users were conducted by all professionals, allowing for a global assessment of the Program users were carried out by all professionals, enabling a global assessment of the participant and the family.

The child/adolescent after adherence to the physical exercise program and the food program, with a sustained reduction of at least 5% of excess weight, with a satisfactory physical condition related to age, and with a stable psychological situation could be discharged from Bom Dia and then be referred to the PAC pole closest to the residence.

The professionals involved in Bom Dia (PAC and CMEM) not only help to publicize the intervention, but also encourage users to

participate in the intervention, organize the physical space, and make the necessary adaptations so that the meetings take place as planned.

The program participants (professionals and intervention coordinators) expressed some barriers and potentialities in the process of implementing Bom Dia at CMEM. As a barrier, the following stood out: physical/environmental structure, material resources, professional skills and work demand. The observed potentialities were: the strength of the evidence, available professional support, commitment/attitude of the team in the implementation of activities for the development and monitoring of activities.

It was evident that the Program has a well-established multidisciplinary team in the CMEM, with professionals available to work exclusively in the program, such as physical education and physical therapy professionals. In addition, the interest and commitment of the target professionals in developing actions aimed at controlling obesity in children at CMEM was considered a potentiating point in the process of implementing the Bom Dia program.

Maintenance

The program has been in operation since 2017 and has continuously carried out an intervention aimed at reducing the problem of the obesity rate and preventing conditions related to obesity in the childhood of patients, within the routine of CNEM care. Some potentialities were identified for the maintenance of the Bom Dia program, they are: available, motivated and qualified multidisciplinary team; commitment and support from organizations such as CMEM's pediatric endocrinology service; social support, since the program provides a VEM for users and guardians who participate in the intervention; involvement of stakeholders/partners and perceptions of benefits concerning improving the quality of life of program user.

Discussion

This study presents the unprecedented results of an evaluation of the intervention to control obesity in children and adolescents in the Bom Dia program, in Recife-PE. The evaluation of this intervention took place according to the RE-AIM criteria (reach, effectiveness, adoption, implementation and maintenance) through data triangulation, providing an appreciation of the challenges and potentialities of this evaluation approach in practice.

Most studies using the RE-AIM framework to assess interventions in obese children are well documented in the international scenario.[18-21] In this sense, this study becomes important and necessary because of the few Brazilian documents on the strategy for treating childhood and youth obesity in public health services, compared with the work already developed with the adult population.[22]

The Reach results pointed to the representation of overweight children/adolescents who do not participate in physical activities outside the school environment. Regarding the characteristic of the target population, characteristics of low schooling and low socioeconomic level are highlighted, like the findings by Jung, Bourne and Gainforth.[20]

Although the reach rate found was only 0.95%, this insignificant "Reach" in this study is like the results found in studies with a similar population in Switzerland, Healthy Together (HT)[19] and the United Kingdom.[23]

As for effectiveness, users of the Bom Bia program showed stability or a slight reduction in BMI during the period evaluated (six months after the start of the intervention) and a slight improvement in laboratory markers (glucose, triglycerides, cholesterol and TGP), which is considered a result. positive for intervention professionals, since an improvement in clinical conditions is seen as one of the goals of the team to reduce the metabolic risk factors that trigger NCDs in adulthood. Regarding the perception of those responsible for the benefits acquired with the intervention of program users, the results obtained in this study are similar to those identified by other interventions to promote a healthy lifestyle discussed in the literature.[6,10,24] The program users reported other important benefits, such as the expansion of knowledge related to food and nutrition, since this knowledge can help in healthy food choices and contribute to the individual's food autonomy.[25]

Regarding the dropout rate from the program (80%), this was considered high when compared to another similar Swiss study in 2014, which obtained a percentage of 40%.[26] The economic conditions of the target audience and the time when the intervention was offered were punctuated as the main barriers that made it difficult to reach those eligible and, consequently, impacted the implementation of the program.

As for the adoption of the intervention, Bom Dia was adopted by a medium complexity service in Recife-PE, the CMEM, and by a multidisciplinary team that was already well structured in the service. This organizational arrangement may have strengthened the adoption of intervention professionals, and therefore, the implementation and organizational maintenance of the program.

In Brazilian studies that also evaluated intervention in the control of childhood obesity, data on the rate of adoption of target professionals were not observed. In turn, the present study showed a target professional adoption rate of 100% since its implementation.

Regarding the Implementation, the study found that Bom Dia was created to encompass activities that promote the control of overweight and obesity in children and adolescents of the CMEM. Overall, Implementation was evaluated to determine whether the program was delivered to the population as planned. In this study, it was found that although the percentage of planned activities implemented was high, the fidelity of the actions was moderate, both for the children and for the intervention professionals. This fidelity may have been caused by a multiplicity of factors, which include a possible lack of commitment on the part of the child's guardian to the program and organizational difficulties in developing what had been planned.

Regarding the barriers highlighted in the intervention implementation process, the lack of professional training, the low adherence of program users, limited physical structure and the geography around the academy pole were highlighted. Despite these significant implementation challenges, team willingness and professional support for the intervention were considered essential for implementing the intervention within the CMEM. In similar programs for the prevention of childhood obesity in the community developed in 2018 in Canada, the importance of the availability of the multi professional team for the development of planned actions in the implementation of the program was also reported.[20]

According to Almeida, Brito and Estabrooks, the maintenance of programs at the organizational level must consider the administrative and operational structure so that there is continuity of what has been proposed.[15] Therefore, in this work, the professionals involved in the program were considered a relevant factor to ensure the maintenance of the intervention in the CMEM, and above all, to emphasize that without their presence it would be very difficult to sustain or institutionalize an intervention. In this sense, the main potentialities

identified were: the willingness/motivation of partner professionals and social support to carry out the program's activities.

Despite the various contributions that Bom Dia provides for the planning of future interventions aimed at the control and prevention of childhood obesity, the present study presented some limitations that could be overcome in other studies, such as small sample size, absence of a control group and impossibility implementation is evaluated based on the cost information recommended in the RE-AIM, due to the complex financial and organizational structure of the program and the unavailability of the total cost of delivering the program.

Conclusion

The results of this study, reported from the RE-AIM model, indicated that the actions proposed by the Bom Dia program to control obesity in children and adolescents from Recife-Pernambuco-Brazil had a positive impact on the life and health of program users. These results will serve as a reference for future intervention studies by using the five domains of the RE-AIM model, and also for implement intervention programs pediatric obesity.

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Ethics committee

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Conflicts of interest

Nothing to declare.

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