PHASE II: SCHOOL BASED SOCIO ECOLOGY MODEL UNDER "MARG" "MEDICAL EDUCATION FOR CHILDREN/ ADOLESCENTS FOR REALISTIC PREVENTION OF OBESITY AND DIABETES AND FOR A HEALTHY AGING"

Based on the findings of phase 1a and 1b, a school health programme "MARG" was planned and implemented in all 10 schools. Details on development of the programme, its implementation, coordination and impact are given this chapter.

METHODS AND MATERIALS

The methods and material for phase 2 are presented under following sub-sections:

- Rationale
- Objectives
- Study design
- Behaviour Change Communication (BCC) in Socio Ecology Model
- Socio Ecology Model (SEM)
- Nutrition Health Education (NHE)
- Tools and techniques of executing NHE through SEM

- Poster and Booklets developed as print media under MARG
- Plans for executing the SEM
- Coordination of the SEM
- Impact assessment of the SEM
- Experimental design

RATIONALE

The concept of coordinated school health programme is still novel and not well implemented in schools of Urban Vadodara. Project "MARG" a healthy school initiative programme was undertaken for providing medical education to adolescents on realistic prevention of obesity and diabetes. In line with the objectives of "MARG" and considering the school settings (phase 1b); this phase of the study was planned to encapsulate concepts of healthy living and nutrition education within school curriculum using coordinated and innovative behaviour change model.

OBJECTIVES

1. To develop the Socio-Ecology Model (SEM) for behaviour change under project MARG in a school setting.
2. To execute the SEM within the school curriculum under project MARG.
3. To coordinate SEM through integrated approach by involving school authorities, teachers, peer students and parents.
4. To assess the impact and sustainability of SEM in a school setting.

STUDY DESIGN

Action research study design

BEHAVIOUR CHANGE COMMUNICATION IN SOCIO ECOLOGY MODEL

Sustainable alterations can only change lifestyle and dietary behaviours acquired over a long time. Moreover modifying the dietary habits requires adopting eating patterns that conflict with desires (Contento, 2011). Therefore imparting knowledge and information along with skills and self-regulatory activities through well-designed model is the need of the hour.

SOCIO ECOLOGY MODEL (SEM)

PRINCIPLE: The Socio-Ecology Model of behaviour change helps to understand the dynamic interrelations among various personal and environmental factors that govern the lifelong course of human development through five well defined systems viz. micro, meso, exo, macro and chrono-system (Langille & Rodgers, 2009) (Figure 5.1).

Under the current study, former 3 systems of the SEM were selected and activities of MARG were implemented under modified SEM. The modified SEM addressed students, teachers and parents (Figure 5.2) at the micro, meso and exo system respectively.

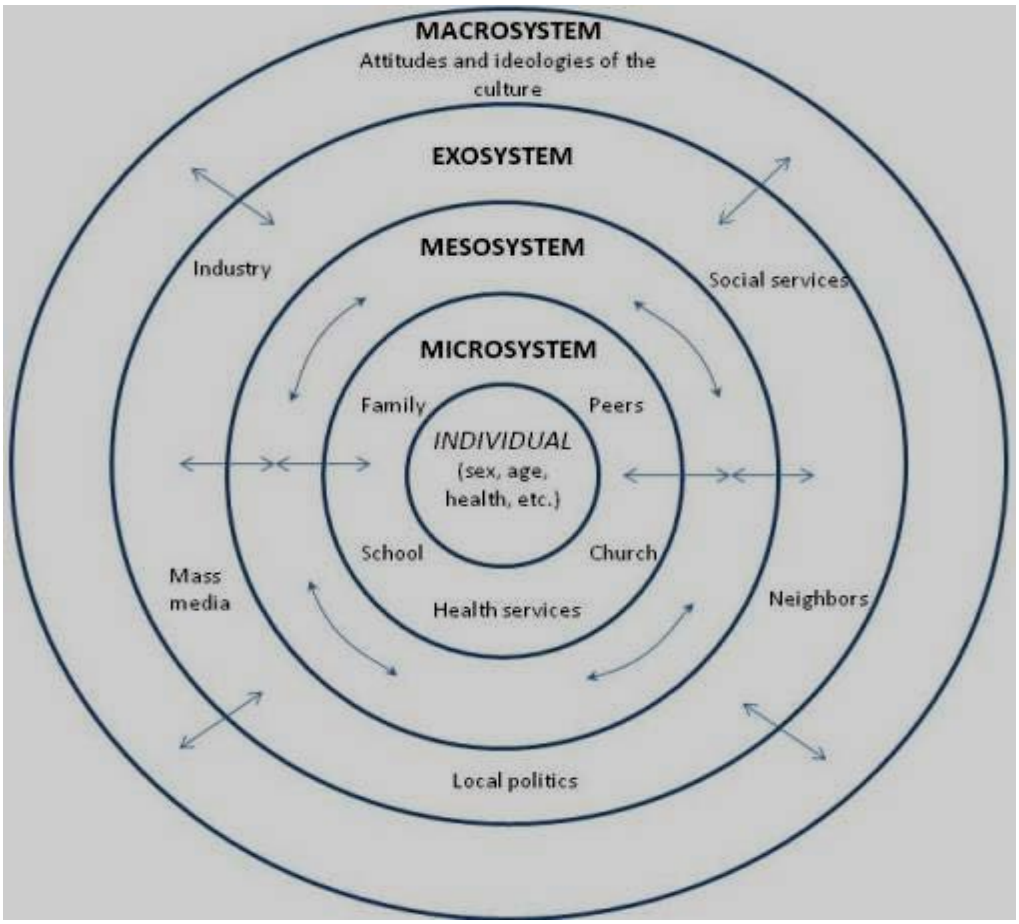
STUDENTS: All the students enrolled in the first year (4^{th} to 9^{th} standard) were followed up for the second consequent year. Addressing all the students would help to create a peer influence for learning and behaivour change.

TEACHERS: Though all the school teachers were involved directly or indirectly in MARG; special focus lied on activity coordinators, science teachers, counselors or the physical education teachers. Involvement of teachers would help to modify the school environment and help in restoring the behaivour change.

PARENTS: Parents (both mother and father) of all the selected students were enrolled; however considering the professional and family commitments drop outs or poor attendance was estimated. Therefore efforts were made to increase the frequency of contacts as much as possible. Involving parents can bring change in the family settings, thereby making the behavioural change sustainable.

PROCEDURE: The SEM was developed in 4 stages namely the intrapersonal, interpersonal, organizational and parent-community stage for addressing the socio-ecological determinants of a child (Figure 5.3). This model was then incorporated in the healthy school programme MARG.

Figure 5.1: Five ecological systems defined under the Socio Ecology Model



**Langille & Rodgers, 2009*

Figure 5.2: Three systems in the modified model of SEM

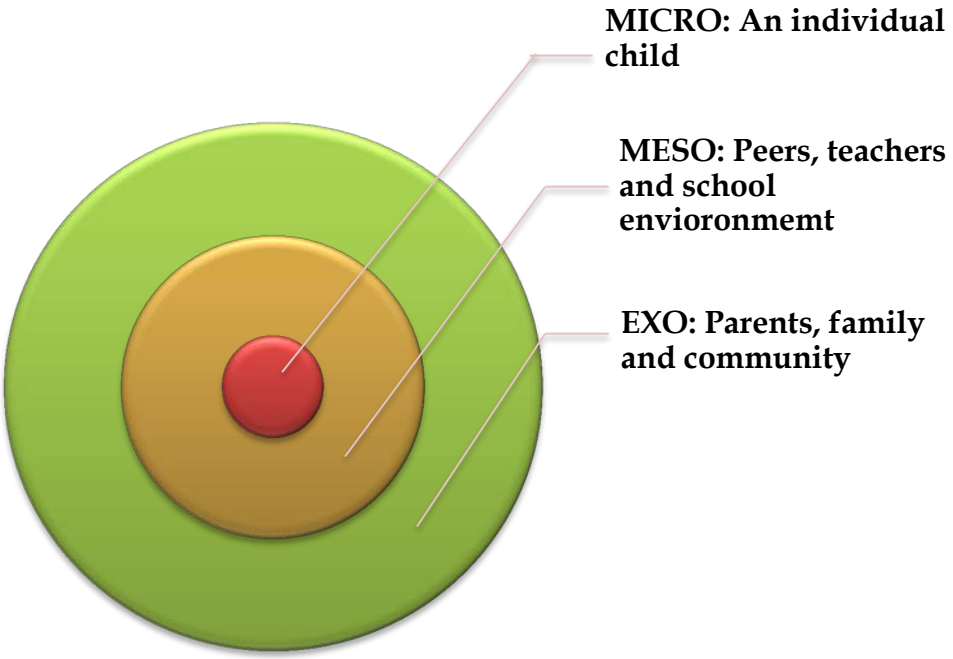
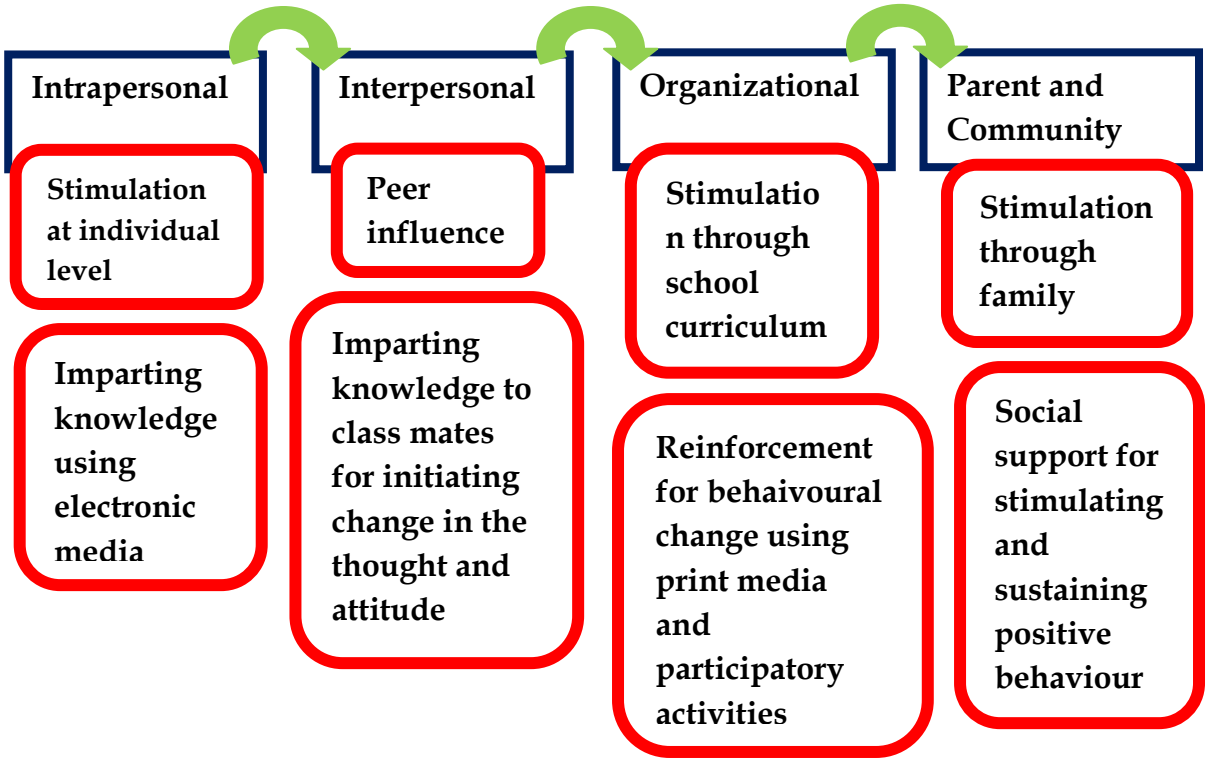


Figure 5.3: Stages of developing SEM



NUTRITION HEALTH EDUCATION (NHE)

Nutrition education is a process of translating the nutrition related knowledge to various groups of people using a combination of methods from the fields of education and communication. Therefore understanding the audience and the context of their behaviour helps in developing effective nutrition education programs (Contento, 2011). In the present study, nutrition education was planned to address the influence of environmental factors on a child's lifestyle and dietary behaviour.

TOOLS AND TECHNIQUES FOR EXECUTING NHE THROUGH SEM

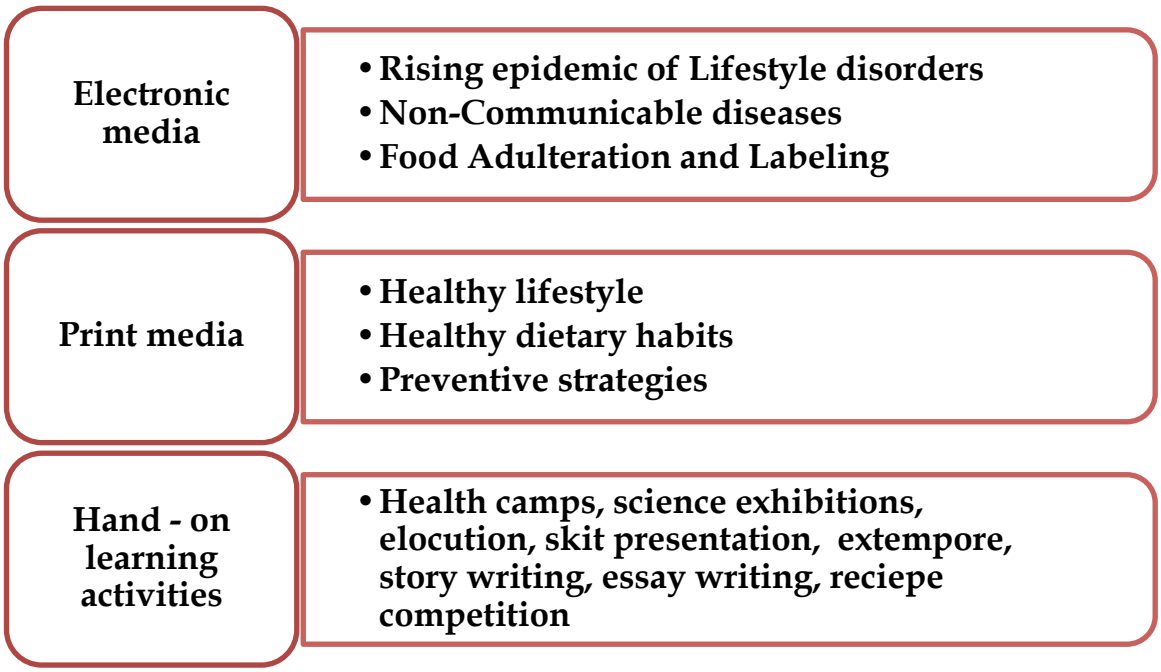
The nutrition and health education was developed and imparted through innovative communication strategies using various forms of media such as electronic and print supported by hand – on learning activities.

1. **ELECTRONIC MEDIA:** Interventions using electronic media, like slide and multimedia presentations complemented with rigorous behavioural change interventions can improve health and safety behaviors in young persons (Hieftje et al, 2013). Power point presentation was developed as electronic media for imparting information and knowledge at the interpersonal stage of SEM development (Annexure 8).

2. **PRINT MEDIA:** It is one of the oldest and most popular forms of methods used for disseminating information as it can reach a wider target audience, are user friendly, handy, and attractive (Child Refuge Report, 2007). Booklets and posters (Image 5.1 to 5.13) were used as a form of print media for reinforcing the health messages at interpersonal and organizational stage of development (Figure 5.4).

3. **HAND – ON LEARNING ACTIVITIES:** Competitions such as essay writing, debate, drawing, quiz, story writing, elocution, recipe, extempore and slogan writing were conducted. Focused group discussion, presentation by children, skit performance, collage, poster and chart making was undertaken to assess skill development and the ability to enact on the imparted knowledge. These activities were integrated in the school curriculum and were evaluated by school teachers, ensuring their participation in the program. This was useful at the interpersonal, organizational and parent and community stage of development of SEM.

Figure 5.4 Topics covered for NHE under different media of SEM



Plan for Executing the SEM

Using different tools and techniques, the NHE was delivered in different combinations through the 4 stages of SEM at each selected system. The nutrition education developed using different media was integrated in the school curriculum so as to fit within the academic school schedule and its execution did not involve additional resources.

COORDINATION OF THE SEM

In order to coordinate activities under SEM, volunteers termed as "Peers" were selected from students, and teacher. From each school minimum of six peer students and two peer teachers were selected. The team of peer volunteers was trained and they had to ensure that the planned activities were conducted as per the schedule; were evaluated and further they were reported to the research investigator. MARG activities were also documented in the school annual magazine (Annexure 9) with the purpose of community outreach.

IMPACT ASSESSMENT OF THE SEM

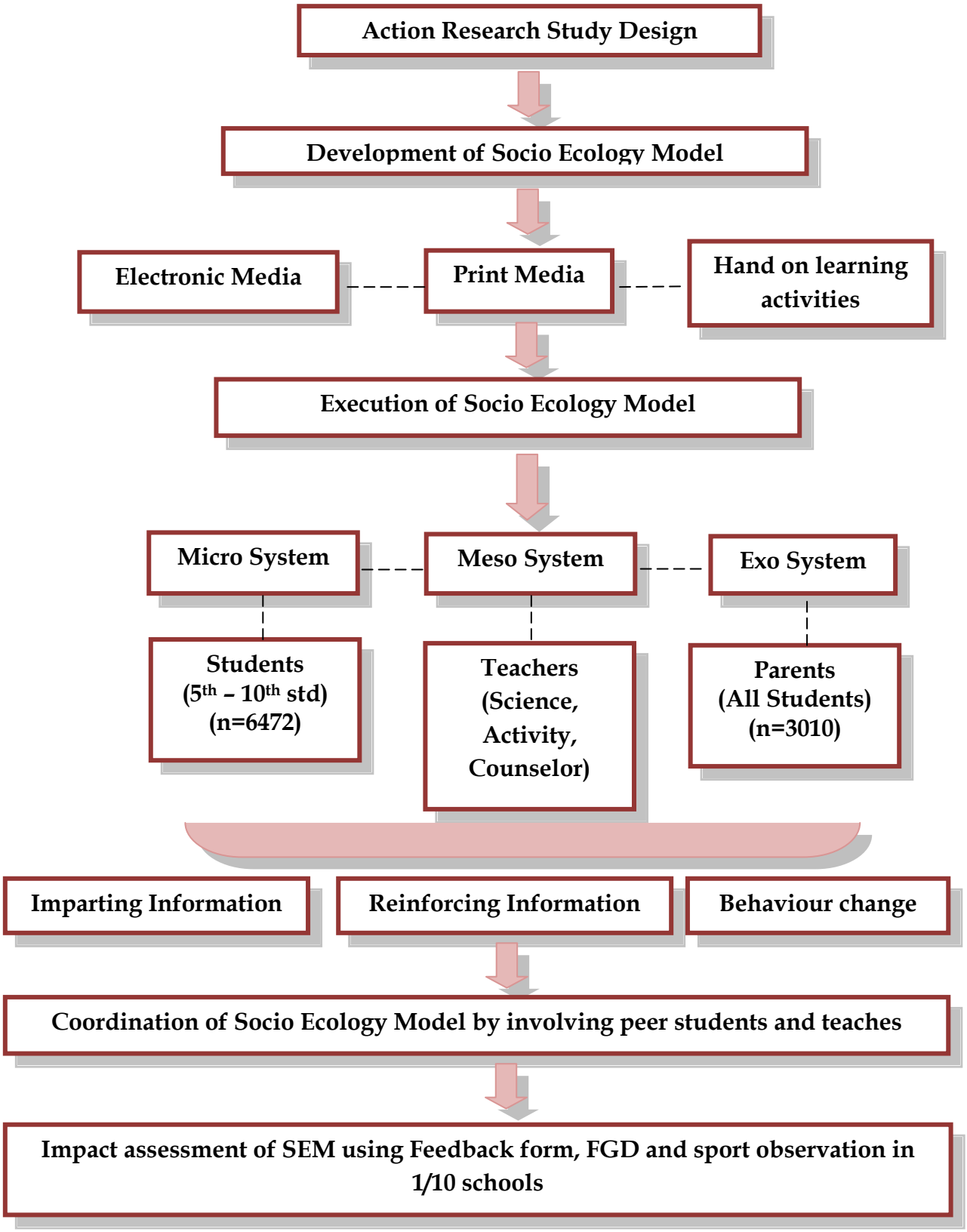
The impact of intervention delivered through different forms of media was evaluated with separate and appropriate tools and techniques. Information given through the electronic media was assessed through feedback forms from the students, teachers and parents (Annexure 10). Effect of the print media was assessed by making group discussions (Annexure 11), while the participatory media was evaluated using spot observations and the evaluation results of most of the competitions.

Impact of sustainability of SEM was also assessed after one year post intervention period (2010-12) in one school to assess the knowledge earned,

attitude and practices by the senior most set of students (standard IX) and their ability to extend it for outreach activities at the exo system.

EXPERIMENTAL DESIGN

Figure 5.5: Experimental Design for phase 2



RESULTS AND DISCUSSIONS

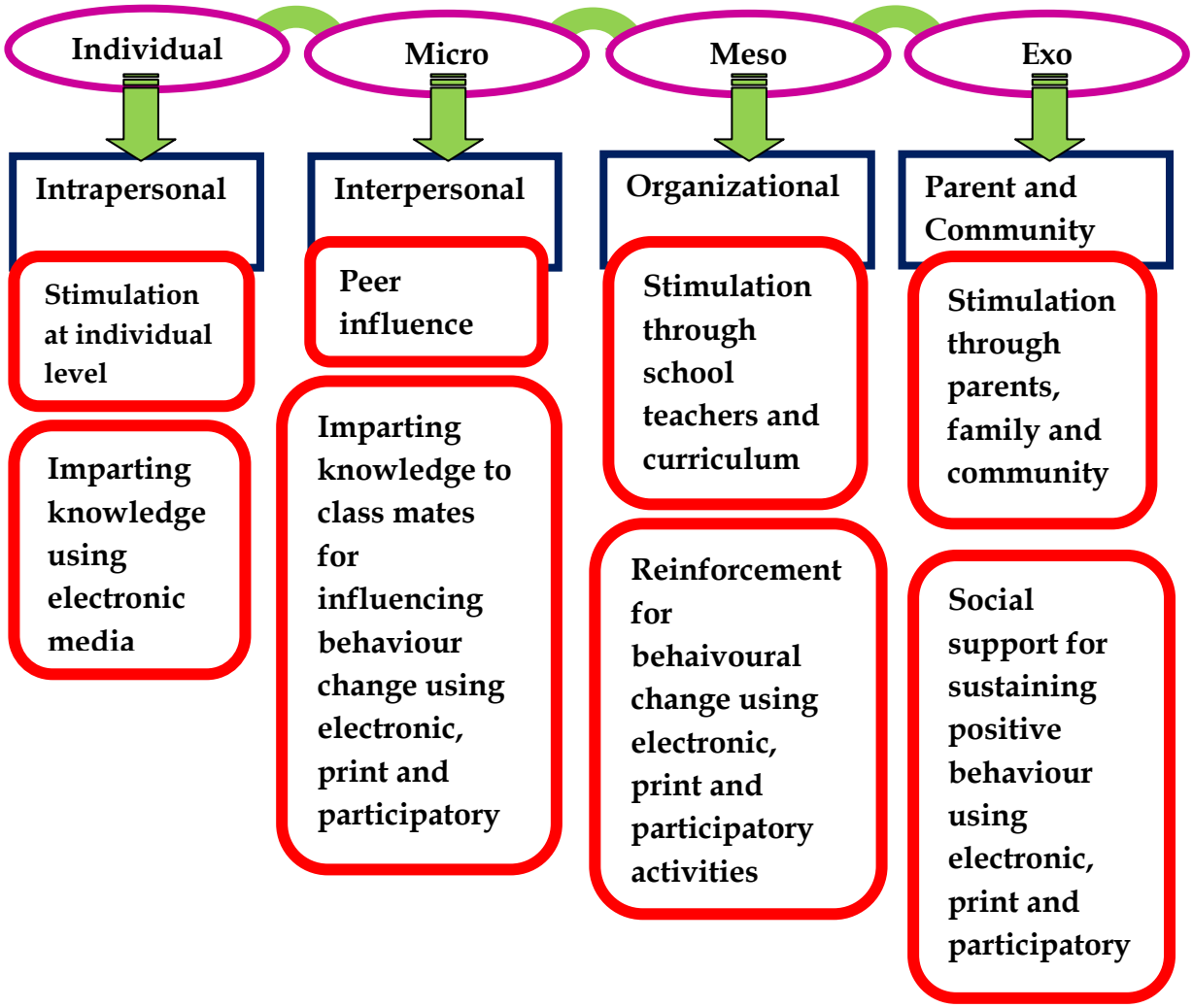
Multi-component behavioural change model for developing a "Healthy School Programme" has not been pilot tested for a longitudinal period of 2 years in urban Vadodara. This phase discusses the results of: Development and execution of a School based Socio Ecology Model under programme "MARG" "Medical education for Children / Adolescents for Realistic Prevention of Obesity and Diabetes and for a Healthy aging; under following heads.

- Development, execution and outcome of SEM at the MICRO system
- SEM execution at the MESO system
- SEM execution at the EXO system
- Summary of the activities, goals, outcomes and strategies under the MICRO, MESO and EXO system of SEM
- Outcome of the SEM at MICRO, MESO and EXO system
- Felicitation

DEVELOPMENT, EXECUTION AND OUTCOME OF SEM AT THE MICRO SYSTEM

Development and execution of the Socio-Ecology Model (SEM) aimed to encapsulate concepts of healthy living and nutrition education for prevention of Non-communicable diseases within school curriculum using coordinated approaches in 10 schools of Urban Vadodara, Western India are presented in this chapter. Figure 5.6 given below demonstrates the stages of development of the programme.

Figure 5.6: Realm of SEM for programme MARG



COMPONENTS OF THE MODEL

All the students of 4th to 9th standard in the ten schools formed the micro system of the SEM. Based on their class of study; they were divided in two groups. The younger classes of 4th to 6th standard formed the elementary group and students of 7th to 9th standard formed the secondary group. A combination of electronic and print media was used for imparting information, reinforcing it and translating the learning's into practice was mediated by the investigator through various learning activities.

TECHNIQUES

a. ELECTRONIC MEDIA: The details of the orientation lectures delivered on "MARG" program are presented in Table 5.1. Different set of presentations were prepared for students of both elementary (4-6th standard) and secondary group (7-9th standard) (Table 5.2). Each session lasted for about 45 minutes including discussion and question-answer rounds. All the queries were addressed by the researcher.

The venue of presentation varied in each school. Class room, yoga room, auditorium, activity room and assembly hall were provided for making the presentations. Choice of venue depended on the facilities available with the school, school schedule and strength of the students in each group. On an average, 32 students were addressed during each session of sensitization. The number of sensitization sessions and students covered in each school is shown in table 5.2. Few highlights of the content covered in the presentations are shown in Annexure 8.

b. PEER STUDENTS: Followed by the orientation sessions students were asked to volunteer as "Peer" for coordinating "MARG" program in their school. From each school 4 – 14 students volunteered to become peers (Figure 5.10) who mainly belonged to the school council/executive committee.

c. **PRINT MEDIA:** After the sensitization sessions, the messages were reinforced using the print media. Booklets, posters and banners were developed and distributed as a part of the print media.

1. **Booklet:** A colourful booklet (20 pages), titled "MARG to Good Health…" was prepared by the central team of Diabetic Foundation of India, New Delhi, and distributed in all the schools among the selected students (4^{th} – 9^{th} standard) during school assembly or in individual classrooms.

   The booklet covered topics such as health, balanced diet, BMI calculations, information about NCDs, recipes for children, cooking tips, calorie counter and much more (Image 5.1) along with coloured photographs and captions. Table 5.3 mentions the details of topics covered in the booklet.

   The enrolled students received the booklets with varied distribution in each school (Figure 5.8) and after reading the summary during school assembly.

2. **Posters:** A set of 12 A3 size posters were developed and displayed for reinforcing the key messages in the schools (Image 5.2 – 5.13).

   Two sets were given to each school and the posters were to be displayed at the reception, school library, corridors, canteen, notice board, and alike in cyclic manner during the two year period of program "MARG" activities. About 30% of the schools displayed the posters continuously for two years, while rest 70% schools displayed it on specific occasions or activities. Various activities such as drawings, collages, chart making competition etc. were conducted for the students. These materials were displayed on rotational basis in 70% of the schools in order to motivate the students. As a result of which the print media provided by the investigator was displayed occasionally.

Banner: Each school was also given a banner of "MARG" imprinted with name of the school. This banner was displayed during events, occasions and different celebrations undertaken as part of MARG.

Table 5.1: Topics covered under the electronic media (power point presentation) for target groups at MICRO system

Sr. No.	Title	Broad outline	Target group	No. of beneficiaries
1.	"MARG": a healthy school initiative	What is MARG: its objectives, time duration and technique of incorporating MARG	All children of the school targeted during school assembly	16,495
		Need for MARG		
		Expected outcome		
2.	Nutrition and physical activity: A simplified concept for a healthy living	Basic concept of food, nutrition and physical activity	Elementary group (4^{th} – 6^{th} standard)	2901
		Understanding the meaning of "Health and Healthy State of Body"		
		Role and importance of food in maintaining health		
		Signs of malnutrition and ways of preventing it		
3.	Nutrition and physical activity: Developing healthy habits	Knowing our food and its impact on health and nutrition	Secondary group (7^{th} – 9^{th} standard)	3571
		Inter-relation between nutrition, lifestyle and upcoming diseased conditions		
		Ways of making healthy choices for food and lifestyle parameters		
		Causative factors and vulnerable population of the lifestyle disorders		
		Ways of preventing the lifestyle disorders		
		Effect of family food habits, kitchen trends and parental history in development of lifestyle disorders		
		Role of parents in encouraging children to be physically active		
4.	Fun in sports and physical activity	Importance of sports, exercise and physical activity in mental and physical development of children	Both elementary and secondary group	5440
		Alternative ways of involving in sports, exercise and physical activity		

The number of beneficiaries varied during sessions due to several reasons

Table 5.2: Frequency of sensitization sessions conducted with students in each selected schools

School Code	Group	Class	Division	Calculated sessions	No. of sessions	No. of students	Total sessions
I	Elementary	3	1	3 std's x 1	3	40 per session	6
	Secondary	3	1	3 std's x 1	3		
II	Elementary	3	3	3 std's x 3	9	31 per session	18
	Secondary	3	3	3 std's x 3	9		
III	Elementary	3	3	3 std's x 3	9	38 per session	18
	Secondary	3	3	3 std's x 3	9		
IV	Elementary	3	2	3 std's x 2	6	25 per session	12
	Secondary	3	2	3 std's x 2	6		
V	Elementary	3	6	3 std's x 6	18	34 per session	36
	Secondary	3	6	3 std's x 6	18		
VI	Elementary	3	3	3 std's x 3	9	25 per session	18
	Secondary	3	3	3 std's x 3	9		
VII	Elementary	3	4	3 std's x 4	12	27 per session	24
	Secondary	3	4	3 std's x 4	12		
VIII	Elementary	3	5	3 std's x 5	15	24 per session	30
	Secondary	3	5	3 std's x 5	15		
IX	Elementary	3	4	3 std's x 4	12	33 per session	24
	Secondary	3	4	3 std's x 4	12		
X	Elementary	3	4	3 std's x 4	12	37 per session	24
	Secondary	3	4	3 std's x 4	12		

**Note: Elementary group – 4th – 6th standard, Secondary group – 7th – 9th standard*

Table 5.3: Details of topics covered in the booklet

Sr. No.	Topics	Details	Expected use
1.	Health	Meaning of health	Understanding the importance of health and ways of achieving health through balanced diet
		Staying healthy	
		Balanced diet	
		Food groups and their recommended servings	
		Age specific RDA for selected nutrients	
2.	Obesity	Understanding obesity	Need for early measurement of overweight and obesity. Awareness building and sensitization for preventive actions
		Causes of obesity	
		Effect of obesity on health	
		Foods to be preferred and avoided for obese	
		Ways to measure the health status	
3.	Diabetes	Meaning and mechanism of diabetes	Prevention through modifying habits and lifestyle measures. Simple ways of monitoring and managing NCD's Awareness building and sensitization among masses
		Damage done by diabetes	
		Who is at risk and ways to check the status	
		Ways of preventing diabetes and foods to be avoided	
4.	Heart disease	Understanding different types of heart conditions	
5.	Hypertension	Understanding blood pressure and its ranges	
		Foods to prefer and avoid in hypertension	
		Healthy alternatives for hypertensive people	
		Clearing the myths regarding hypertension	
6.	Calorimeter		Adoptable lifestyle and dietary modifications
7.	Healthy and easy cooking tips and recipes		
8.	Physical activity	Tips for being physically active	
		Calorie burn check	
9.	Tips for Family: ways of living a healthy lifestyle		
10.	Health check games		

Figure 5.7: Total sessions of presentations made in each school

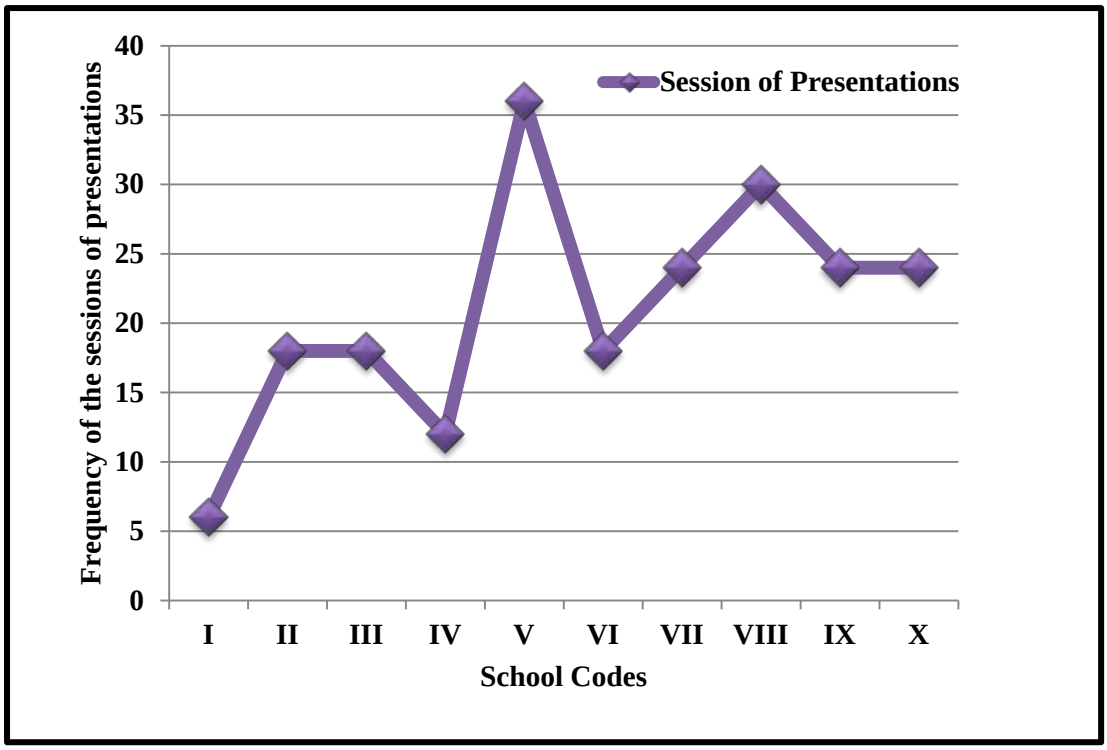
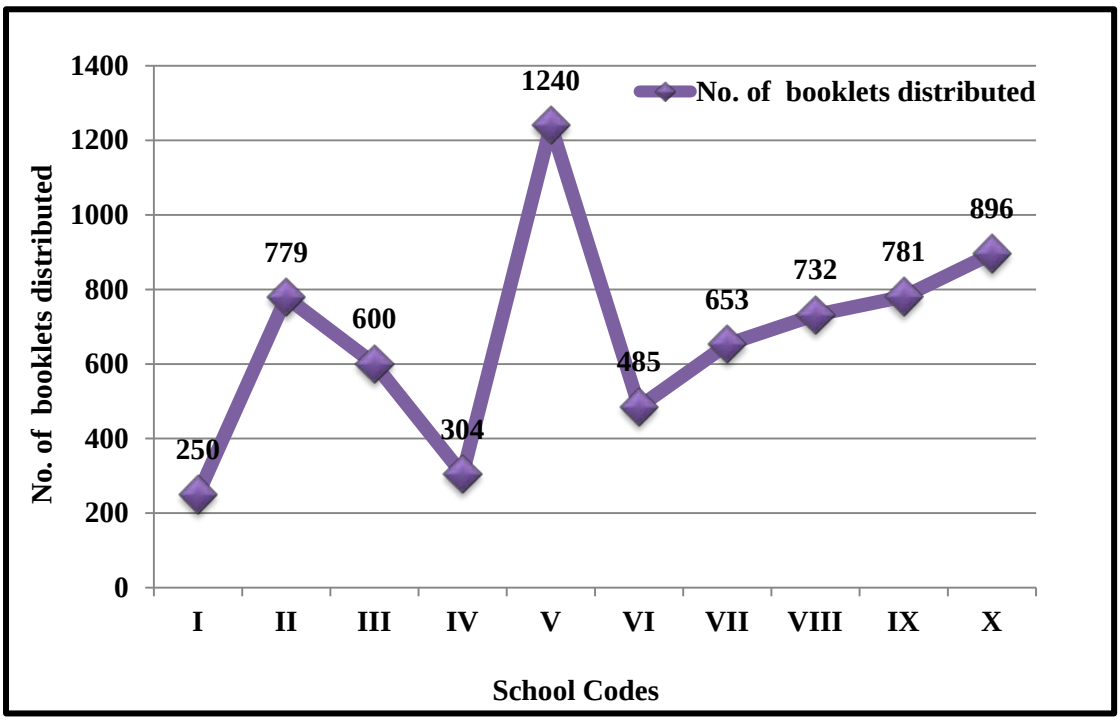


Figure 5.8: Number of booklets distributed to students in each school



SEM EXECUTION AT THE MESO SYSTEM

COMPONENTS OF THE MODEL

Organizational setup is the key for improvement of behaviour of the micro systems. Thus school principals and teachers were directly or indirectly involved with our target group of children from 4-9th std and they played an integral part in altering the physical environment of the school at the meso system.

TECHNIQUES

The teachers were given training, peer teachers were identified and various activities were developed within the school curriculum. These activities were executed and evaluated using print and electronic media at interpersonal, intrapersonal stages of the model.

a. TEACHER TRAINING PROGRAM: These sessions were carried out in all 10 schools for school principals and teachers directly or indirectly involved with our target group of children from 4-9th std (Figure 5.9). Training sessions (2-3), lasting 45-60 min, were conducted during school hours, using power point presentations (table 5.4) followed by discussions for planning of activities and peer teacher identifications (Table 5.5), (Image 5.18 to 5.22). These were broadly divided into the following titles:

- Meaning of healthy food and balanced nutrition
- Lifestyle disorders
- Tips on healthy cooking
- Effective ways of adopting healthy lifestyle
- Role of teachers in developing healthy behaviour and many more

Figure 5.9: Number of teacher's covered during the presentation sessions

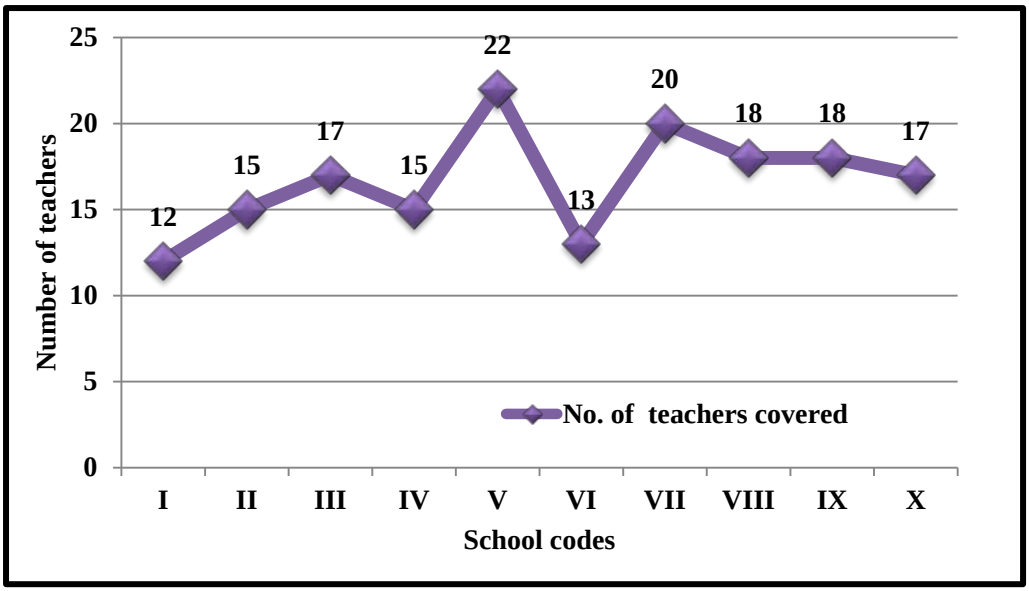


Table 5.4: Topics covered under the electronic media (power point presentation) for teachers at MESO system

Sr. No.	Title	Broad outline	No. of beneficiaries
1.	"MARG": a healthy school initiative	What is MARG: its objectives, time duration and technique of incorporating MARG	180
		Need for MARG	
		Expected outcome	
		Ways of preventing the lifestyle disorders	
2.	Nutrition and physical activity: An important concept in current education system	Need for nutrition education in school curriculum	92
		Food and nutrition concepts that need to be taught at school level	
		Role of teachers in providing nutrition education to children	
		Expected benefits of nutrition education imparted at school level	
3.	School sports club for preventing lifestyle disorders	Importance of sports, exercise and physical activity in mental and physical development of children	150
		Spectrum of activities that should be offered in schools, time to be spent and intensity of activity to be performed ideally	

** The number of beneficiaries varied each time*

b. "PEER TEACHER" IDENTIFICATION AND TRAINING: "Peer" teachers were identified after the teacher training program in each school who were volunteer leaders for carrying out the programme "MARG" activities in school for the 2 year duration. These teachers were activity coordinators, science teachers, counselors or the physical education teachers. A positive involvement of the teachers could enable execution of the planned activities at the micro level during the school timings.

Frequent meetings were held with the peers once a week for training, capacity building and planning and execution of activities in school.

Table 5.5, shows details of tentative activities planned by the "peers" which was to be executed in the school within the school timings and curriculum. Every school was given the flexibility of making minor modifications in the schedule so as to include the activities within its annual school planner. All "peers" represented program "MARG" in their school and prepared a feedback for each activity which was coordinated by the researcher.

Figure 5.10: Number of peer teacher and student volunteers under MARG

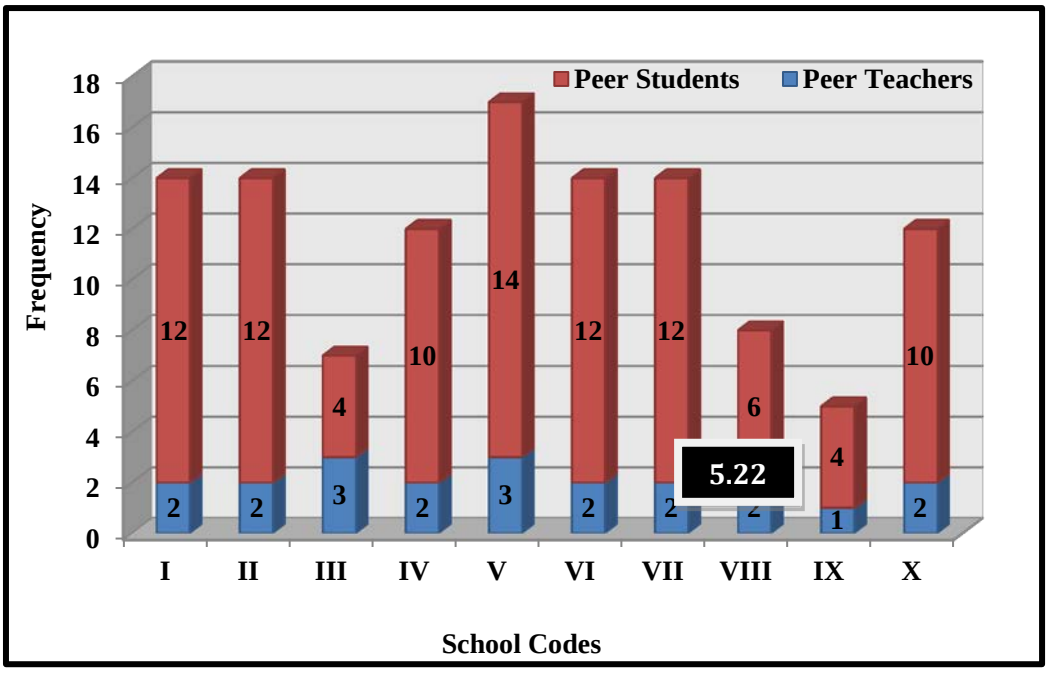


Table 5.5: Tentative planned activities for each school planned by the "peer teachers"

Sr. No.	Activities	School Codes									
		I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**
1.	Nutrition Health Rally		T #	T #						T #	T #
2.	Essay writing competition	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠			S ≠
3.	Debate		S ≠	S ≠	S ≠		S ≠	S ≠		S ≠	S ≠
4.	Drawing competition	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠
5.	Quiz	S #	S #		S #		S #	S #	S #	S #	
6.	Focused Group Discussion	P ≠		P ≠		P ≠	P ≠	P ≠	P ≠	P ≠	P ≠
7.	Story writing	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠
8.	Presentation by children	S ≠	S ≠	S ≠	S ≠				S ≠		
9.	Health Camp	T,P ,S			T,P ,S	T,P ,S	T,P ,S	T,P, S	T,P, S	T,P ,S	
10.	Collage Making	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠
11.	Poster Making	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠
12.	Chart Making	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠
13.	Elocution		S ≠		S ≠	S ≠			S ≠		S ≠
14.	Recipe Competition	P #	P #	P #	P #	P #	P #	P #	P #	P #	P #
15.	Rally	S	S	S	S				S	S	S
16.	Science Exhibition	T,P ,S	T,P, S	T,P ,S	T,P ,S	T,P ,S	T,P ,S	T,P, S	T,P, S	T,P ,S	T,P, S
17.	Skit Presentation	P			T	S			S		
18.	Extempore				S ≠	S ≠	S ≠	S ≠			S ≠
19.	Slogan Writing	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠	S ≠

**T – Teachers, P – Parents and S – Students; # - Evaluated by external source, ≠ - Evaluated by teachers*

c. IN SCHOOL ACTIVITIES: The details of the activities executed by the students under the guidance of peer students and teachers are shown in table 5.6. All activities had a health and nutrition component in them. More than 50 different batches of these activities were conducted during class hours by the "peer" teachers along with class teachers wherein the researcher's presence was not compulsory indicating the success of the capacity building sessions during the teacher training program.

d. USE OF MEDIA IN MESO SYSTEM: Booklets, posters and banners were used as a teaching aid by the "Peer" teachers. In each school besides the students copies of the booklets, booklets were distributed to the teachers (based on the teacher strength) of each school and 5 copies were submitted to each school library.

Table 5.6: Participatory activities conducted at the MICRO system by the MESO system

Sr. No.	Name of the activity	No. of students to be covered	Nature of incorporation
Elementary group of students			
1	Slogan writing competition	1386	Extracurricular
2	Quiz	1635	Extracurricular
3	Drawing competition	2386	Within schedule
4	Essay writing competition	2185	Within schedule
5	Chart making	3019	Within schedule
6	Story writing	3535	Within schedule
7	Poster making	1933	Within schedule
8	Collage making	2025	Within schedule
Secondary group of students			
1	Group discussions	281	Extracurricular
2	Skit presentation	2212	Extracurricular
3	Recipe competitions	188	Extracurricular
4	Elocution	336	Within schedule
5	Extempore	1502	Within schedule
6	Debate competitions	4126	Within schedule
7	Presentations made by students	550	Within schedule

SEM EXECUTION AT THE EXO SYSTEM

COMPONENTS OF THE MODEL

If the child's ecology is in rhythm with his learning's, reinforcement becomes easy. Therefore to ensure sustainability and ease in modifying the behaviour of children, parents of the selected children from 4-9th std and communities near the selected school were included as the EXO system.

TECHNIQUES

Open seminars, newsletters, rally, exhibitions, health camps, recipes competitions, inter and intra activities using print and electronic media were applied at the EXO system.

a. OPEN SEMINAR FOR PARENTS: Separate open seminars were conducted in all the schools by the researcher and the Principal Investigator of the "MARG" project, Dr. Vanisha S. Nambiar. These interactive sessions (40-60 min), were followed by question answer sessions. Following the power points presentations, "MARG" booklets were distributed and the seminar ended with question answer sessions and handing over the feedback forms to the researcher.

Table 5.7 lists the topics covered during the presentations. The feedback responses of parents on their learning's and inclination for behaviour change are given in table 5.8 and 5.9. Table 5.10 gives some of the verbatim of the parents.

Table 5.7: Topics covered under the electronic media (power point presentation) for parents at EXO system

Sr. No.	Title	Broad Outline	No. of Beneficiaries
1.	"MARG": a healthy school initiative	What is MARG: its objectives, time duration and technique of incorporating MARG	5536
		Need for MARG	
		Expected outcome	
		Ways of preventing the lifestyle disorders	
2.	A family perspective for the rising epidemic of lifestyle disorders	Disease conditions categorized under lifestyle disorders	4300
		Effect of family food habits, kitchen trends and parental history in development of lifestyle disorders	
3.	Role of daily sports and exercise for preventing lifestyle disorders	Importance of sports, exercise and physical activity in mental and physical development of children	3138
		Role of parents in encouraging children to be physically active	

**Number of parents varied each time due to above mentioned constraints*

Table 5.8: Feedback of parents obtained understanding various healthy behaviour (n=4000)

Questions		Understood completely	Understood partially	Did not understand at all
MARG	Concept	71 (2840)	17 (680)	12 (480)
	Need	66 (2640)	31 (1240)	3 (120)
	Implementation strategy	67 (2680)	30 (1200)	3 (120)
Dietary habits	Food groups and balanced diet	58 (2320)	32 (1280)	21 (840)
	Nutritional facts and fallacies	34 (1360)	51 (2040)	15 (600)
	Making healthy food choice	49 (1960)	39 (1560)	12 (480)
	Unhealthy dietary habits	41 (1640)	39 (1560)	20 (800)
Lifestyle practices	Components included in Lifestyle	60 (2400)	44 (1760)	14 (560)
	Lifestyle disorder causes and consequences	35 (1400)	26 (1040)	10 (400)
	BMI and monitoring of nutritional status	30 (1200)	45 (1800)	25 (1000)

**Values in paranthesis are the frequencies*

Table 5.9: Feedback of parents obtained on feasibility of practicing various healthy behaviour (n=4000)

Questions		Can practice completely	Can practice partially	Cannot practice at all
MARG	Possibility of implementing MARG in school	63 (2520)	27 (1080)	10 (400)
	Can MARG be sustained by parents and teachers together	43 (1720)	47 (1880)	10 (400)
Dietary habits	Healthy eating options	57 (2280)	30 (1200)	13 (520)
	Healthy cooking tips for mother	47 (1880)	32 (1280)	21 (840)
	Monitoring the quantity of meal consumed	44 (1760)	40 (1600)	16 (640)
Lifestyle pattern	Can sedentary life be made active life	40 (1600)	37 (1480)	23 (920)
	Can parents contribute to increase the physical activity of children	52 (2080)	26 (1041)	22 (880)
	Can physical activity be performed daily	61 (2440)	30 (1200)	9 (360)

**Values in parenthesis are the frequencies.*

Table 5.10: Few verbatim shared by the parents

Verbatim	Summary
School canteen ma aapirahel menu ne badalvani jarur che	As a part of the project please make changes in the food given in school canteens
Tamaru presentation joyapachi maro chokaro have rojje ghare dorda-kudaka mare che	My child has started doing "skipping" as exercise at home after attending your presentations
Balako na swasthy mate Vhalitarike ame je pan karishakiye che te sikhawamaluche	We have got to know what all can we do as parents for maintaining health of our children
Avubiju pan koi lecture rakhjo	Do arrange for another such lecture
Khub navu – navu janva malu	We got to know so many new things
Balako ma vadhi rahela vajan no swasth par shu parinam thai shake che te mane aa lecture parthi janva malu che	Only after attending the lecture I have realized the seriousness of childhood obesity and that it can be preventable
Lifestyle thi thati bimariyo ek serious muddo chhe, etle eni taraf dhyan aapvu khub jaruri che	Lifestyle disorder is a serious issue and should be treated with urgency mostly from preventive perspective
Nani tev ne badalva thi ghar na vatavaran ma khub pher padi shake che, etle vhalione avi mahiti apavi khub jaruri che	Small and thoughtful measures taken at home can make a healthy atmosphere therefore such efforts should be made to sensitize the parents

Figure 5.11: Examples of verbatim by parents

"This programme has helped us increase our knowledge and understanding about food, nutrition and health" ***– Mother of VIth Std. Girl***

"After attending the sessions of this programme, I feel empowered and have gained confidence that I can feed healthy meals to my family" ***– Mother of IXth Std. Girl***

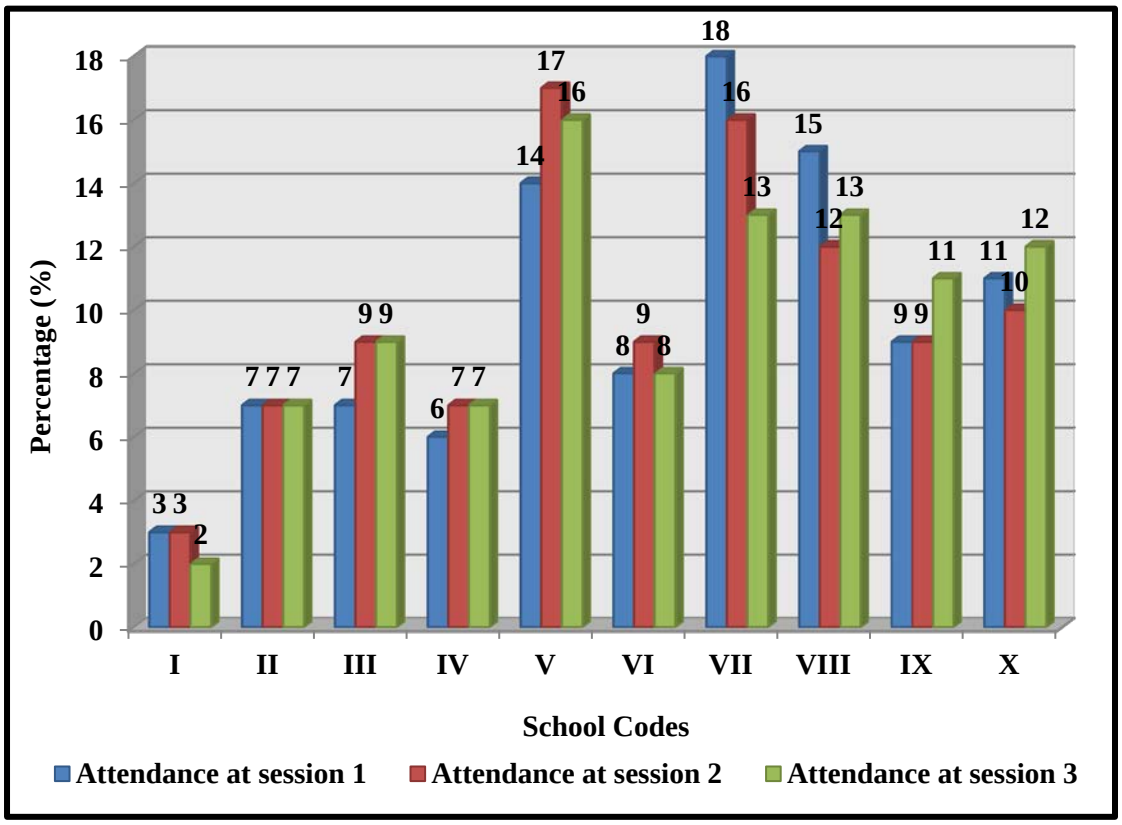
"The programme has helped me solve many problems regarding my child's eating and lifestyle habits" ***– Mother of IXth Std. Boy***

"The experience during the recipe competition was enriching and enjoyable; please organize such activities for us" ***– Mother of VIIth Std. Girl***

"MARG has given an opportunity to the parents to link closely with the school"

– Mother of Vth Std. Boy

Figure 5.12: School wise distribution of parents who attended the 3 sensitization sessions



b. RECIPE COMPETITION: A recipe competition with the concept of "Making Junk Food Healthy" was conducted for mothers of the children in 2 out of 10 schools during the school hours. The evaluation was done on mother's ability to add variety and taste to the food while maintaining the nutritive value of the recipe (Image 5.25).

c. HEALTH CAMP: Under the supervision of the researcher health camps were conducted in 7 schools wherein in 1 school, it was open for parents. Generally the health camps are conducted during months of November-December. Repeated follow up was done by our team, and by the end of two years, seven schools could conduct the health camp and 10329 students were benefited. Parents of children who were doctors were involved in conducting the health camps in majority of the schools and feedback / advice given to the children at the end of screening.

d. SCIENCE EXHIBITION: Special stall for nutrition and health were set up by the "peer" students in the annual science exhibition in 2 schools, and 1 school set up the BMI counter with counseling material as "MARG" booklet (Image 5.26). These exhibitions were attended by parents, friends of the students of the micro systems including some members of the surrounding community.

e. INDIVIDUALIZED DIETARY AND PHYSICAL ACTIVITY COUNSELING: These were conducted on request from either parents or students. During orientation sessions and open seminars, email of the researcher was shared and personalized counseling for school students were conducted for children ranging from 3-28 in each school. The cases ranged from overweight, underweight, anorexia, sports nutrition, anemia, and others.

f. **RALLY:** Largest community mobilization was the rally organized by 3 schools in the neighboring communities. The use of NHE materials prepared under the school activities such as posters making, chart making and drawing competitions were used along with the school "MARG" banner and posters developed by the "MARG" team. The dates were during the "Nutrition week" September 1-7 and "World Diabetes Day" 14 November, and were conducted during school hours. The route was through the main streets followed by housing society's coverage. Children (n=867), led by "peers", enthusiastically shouted the slogans and health messages made by the children could be displayed at community level.

g. **SCHOOL MAGAZINES AND NEWSLETTERS:** The "Peer" teachers were also involved in the propagation of "MARG" through their school magazines and annual reports to the entire EXO community which comprised of their students.

SUMMARY OF THE ACTIVITIES, GOAL, OUTCOME AND STRATEGIES UNDER THE MICRO, MESO AND EXO SYSTEM OF SEM

Table 5.11 shows the summary of the strategies, goals and outcomes of the activities planned and executed under the SEM using the micro, meso and exo components. Overall the outcome ranged from

- Development of presentation skills
- Enhanced knowledge about NCD's
- Trigger thinking of children in the direction of the changing health scenario
- Explore and sensitize the children on the upcoming health issues
- Make nutrition learning innovative, creative and enjoyable

- Help explore on different spectrum food and understand the relation of health and nutrition
- Increase the enthusiasm and interest by play way method
- Capacity building, support and involvement of "peer" teachers and students
- Provide an opportunity to the mothers to think and create healthy recipes
- Reinforce learning, support and involvement of teachers
- Create confidence among students to explain, demonstrate, discuss and present their learning to rest of the school as well as community.
- Involve parents and allow them to judge how much the students have learnt under MARG
- Create awareness about diabetes, its causes, signs and symptoms and prevention during street walks across the city of Vadodara
- Create awareness about health and nutrition during street walks across the city of Vadodara

Table 5.11: Summary of the strategies, goals and outcomes

1. ***Activity details: Power point presentations, prepared and delivered by students on "Non-Communicable Diseases"***
    - Combination of Meso and Micro system
    - 100 parents and 6 teachers participated

Goal and expected outcome:
- To develop presentation skills
- To explore on non-communicable diseases

Strategies:
- Individual assignment submitted as part of computer science practical
- Evaluation graded by science and computer teachers

2. ***Activity details:***
    - ***Debate: "Fast food is healthy" - 4126 students participated***
    - ***Elocution: "Nutrition Transition in Industrialized countries" – 336 students participated***
    - ***Extempore: " Nutrition Transition in Industrialized countries" - 1502 students participated***
    - Combination of Meso and Micro system

Goal and expected outcome:
- To trigger the thinking of children in the direction of the changing health scenario
- To help explore and sensitize the children on the upcoming health issues

Strategies:
- Conducted as part of the school curriculum
- Graded evaluation
- Evaluation made by science and English teachers

3. ***Activity details:***
    - ***Story writing: "Karan's Fatness became his illness" and "Raj ate in restaurant for a week and fell ill" - 3535 students participated***
    - ***Essay writing: "Importance of breakfast among school going children" and "Causes and prevention among childhood obesity" – 2185 students participated***
    - ***Slogan writing: "Healthy dietary habits", "Nutrition and non-communicable diseases", "Lifestyle disorders" - 1386 students participated***
    - Combination of Meso and Micro system

Goal and expected outcome:
- To trigger the thinking of children in the direction of the changing health scenario
- To help explore and sensitize the children on the upcoming health issues

Strategies:
- Conducted as part of the school curriculum
- Graded evaluation
- Evaluation made by science and English teachers

4. ***Activity details:***
    - ***Drawing: "Healthy Foods" - 2386 students participated***

- ***Collage: "Seasonal Fruits and Vegetables" – 2025 students participated***
- ***Chart making: "Nutrition and Exercise for healthy bones" - 3019 students participated***
- ***Poster making: "Effect of diabetes on functioning of heart, kidney, eyes and pancreas" – 1933 students participated***
- Combination of Meso and Micro system

Goal and expected outcome:

- To make nutrition learning innovative, creative and enjoyable
- To help explore on different spectrum food and understand the relation of health and nutrition

Strategies:

- In few schools the activity was conducted as part of the school curriculum and in some it was a part of the extracurricular activity
- The evaluation made by science, drawing and activity teachers
- The evaluation was either graded or awarded

5. ***Activity details: Quiz on "Effect of globalization on nutrition, dietary and lifestyle transition"***
   - Combination of Meso and Micro system
   - 1635 students participated

Goal and expected outcome:

- To increase the enthusiasm and interest

Strategies:

- Was taken up as school based activity under science subject
- Was evaluated by the school teachers and graded

6. ***Activity details: Group discussion on "Understanding of Health"***
   - Micro system
   - 281 students participated

Goal and expected outcome:

- To revise and rebuild the thoughts, shape the attitude and promote behaviour change

Strategies:

- Was conducted during free periods, without giving any prior notice to the students

7. ***Activity details: Celebration of "World Diabetes Day" (14th November, 2011)***
   - Combination of Exo – Meso - Micro system
   - 117 teachers and student peers from all 10 schools participated

Goal and expected outcome:

- To create awareness and provide exposure

Strategies:

- A group discussion and open forum was organized along with a musical programme for all the diabetics enrolled with an NGO which catered to diabetics of Vadodara city and provided them low cost biochemical checkups and medications.

8. ***Activity details: Recipe competition for children: "Making Junk Food Healthy"***
   - Combination of Meso and Micro system

- 188 students and 9 teachers participated

Goal and expected outcome:

- To provide an opportunity to the students to think and create healthy recipes
- Increase familiarity with food
- Understand the concepts of healthy and unhealthy combinations
- Increase interest in food and its concepts
- Reinforce the learning
- Support and involvement of teachers

Strategies:

- Conducted during activity period
- Team work
- Ingredients and pre-preparations to be done from home
- Displayed in schools and exhibited for the entire school
- Evaluated by external nutrition expert along with one school teacher
- The evaluation was graded

9. ***Activity details: Recipe competition for parents: "Making Junk Food Healthy"***

- Combination of Meso and Exo system
- 200 parents and 9 teachers participated

Goal and expected outcome:

- To provide an opportunity to the mothers to think and create healthy recipes
- Reinforce the learning
- Support and involvement of teachers

Strategies:

- Conducted during holidays
- Solo participation
- Ingredients and pre-preparations to be done from home
- Displayed in schools
- Evaluated by external nutrition expert along with one school teacher
- The winner was felicitated

10. ***Activity details: Rally during "Nutrition Week" (1-7th September, 2011)***

- Combination of Exo – Meso - Micro system
- 117 teachers and student peers from all 10 schools participated

Goal and expected outcome:

- To create awareness about health and nutrition during street walks across the city of Vadodara

Strategies:

- The route of the rally was planned with an aim to cover the busy streets of Vadodara city with necessary permissions and ended in the cross roads near the traffic signal so as to educate maximum public during peak office hours.
- Posters depicting messages on "Healthy Eating, Balance Diet, Regular Exercise, Heart Disease, Diabetes, Obesity" etc. were used
- School children also developed their own posters for this rally

11. Activity details: Rally on "Freedom from diabetes"

- Combination of Exo – Meso - Micro system
- 750 student and 10 teachers participated

Goal and expected outcome:

- To create awareness about diabetes, its causes, signs and symptoms and prevention during street walks across the city of Vadodara

Strategies:

- The route of the rally was planned with an aim to cover the busy streets of Vadodara city with necessary permissions and ended in the cross roads near the traffic signal so as to educate maximum public during peak office hours.
- Posters depicting messages on "Healthy Eating, Balance Diet, Regular Exercise, Heart Disease, Diabetes, Obesity" etc. and healthy slogans were made by the children for using during the rally.

12. Activity details: Science exhibitions

- Combination of Exo – Meso - Micro system
- 3313 individuals participated including students, teachers and parents
- Conducted after school hours

Goal and expected outcome:

- To create confidence among students to explain, demonstrate, discuss and present their learning to rest of the school as well as community
- To involve parents and allow them to judge how much the students have learnt under MARG

Strategies:

- There was a health assessment stall, where the trained peers took BMI of the people and gave them their nutritional status
- Best charts and posters made by the children were displayed and explained by the children

13. Activity details: Health camps

- Combination of Exo – Meso - Micro system
- 7 schools organized it - 10329 individuals including students and teachers and in 2 schools parents were also given certain benefits

Goal and expected outcome:

- To sensitize the students, teachers and parents on health monitoring and early diagnosis
- To improve "health services" in a school setting

Strategies:

- Efforts were made to convince and collaborate with parents who were doctor by profession to provide voluntary services in respective schools
- Efforts were undertaken by peer students and teachers
- Measuring BMI, general check up, dental, gynecological check up etc were performed

OUTCOME OF THE SEM AT MICRO, MESO AND EXO SYSTEM

The outcome at 3 systems of the SEM has been categorized under different heads. Many constructive changes were observed at MESO system where as at the EXO system innovative strategies were used to mobilize the communities.

ENHANCED LEARNING (MICRO SYSTEM): 43% students were randomly selected (2760 out of 6472) for collecting the feedback on learning's from "MARG". Based on their feedback forms, using content analysis qualitative method, a summary of lessons learned were calculated. Table 5.12 indicates that 72% learned about food groups, 89% understood about junk foods and 76% understood about balanced diet. Some examples of verbatims of are presented in figure 5.13. The students of elementary group showed more interest in the disseminated information than the secondary group; which reveal high receptiveness and enthusiasm among younger children. The colourful booklet was a great source of attraction to the students and a resource material for the teachers.

The innovative breakfast, lunch and dinner recipes, calorimeter of the favourite foods of adolescents, BMI calculator and physical activity tips given in it were liked the most (Figure 5.13). Overall 42% liked the physical activity tips, 36% liked the calorimeter and 22% liked the innovative recipes in the print media (Figure 5.14).

CANTEEN AND FOOD SERVICE MODIFICATIONS (MESO SYSTEM): Following the school food service evaluations undertaken in phase 1b, individual reports were prepared for each school and submitted to the school principals.

Peer teachers in respective schools were thereafter involved for implementing the recommendations given by the researcher in their respective schools.

School principal (50%) and management tried to bring about changes in the menu served at their school canteens. As reported by the peer teachers, frequency of fruits served in the schools increased and the frequency of junk food such as bread, bun, noodles and Chinese food reduced. Table 5.13 enlists some of the modified menus.

Table 5.12: Learning's from the sensitization sessions (n=2760)

Parameters	Learned	Didn't learn
Knowledge of food groups	72 (216)	28 (84)
Healthy combinations	66 (198)	34 (102)
Importance of quantity of food	58 (174)	42 (126)
Balanced diet	76 (288)	24 (72)
Understanding about junk food	89 (267)	11 (33)
Unhealthy ingredients in diet	69 (207)	31 (93)
Unhealthy combinations of diet	42 (126)	58 (174)
Replacing unhealthy ingredient with healthy ingredient	55 (165)	45 (135)
Concept of taste and health	64 (192)	36 (108)

****Values in parenthesis is the frequency***

Figure 5.13: Verbatim of student's feedback and discussion

"The presentation helped me to know what is "empty calories" and how much do I take in" ***– Avani Vora, Vth Std.***

"I had only heard about BMI, overnutrition and such other terms, but after the presentation, I have completely understood the concept" ***- Darshil Bhatt, VIIth***

"Learning about food is so important and interesting. I think I will now be able to make better dietary choices" ***- Jaan Patel, Vth Std.***

"Only after the presentation I got to know the seriousness of diseases such as diabetes and hypertension. I would like to follow the preventive tips showed in the presentations to stay away from such diseases" ***- Kunj Amin, VIth Std.***

Figure 5.14: Topics covered in the nutrition education material and liked by the students covered

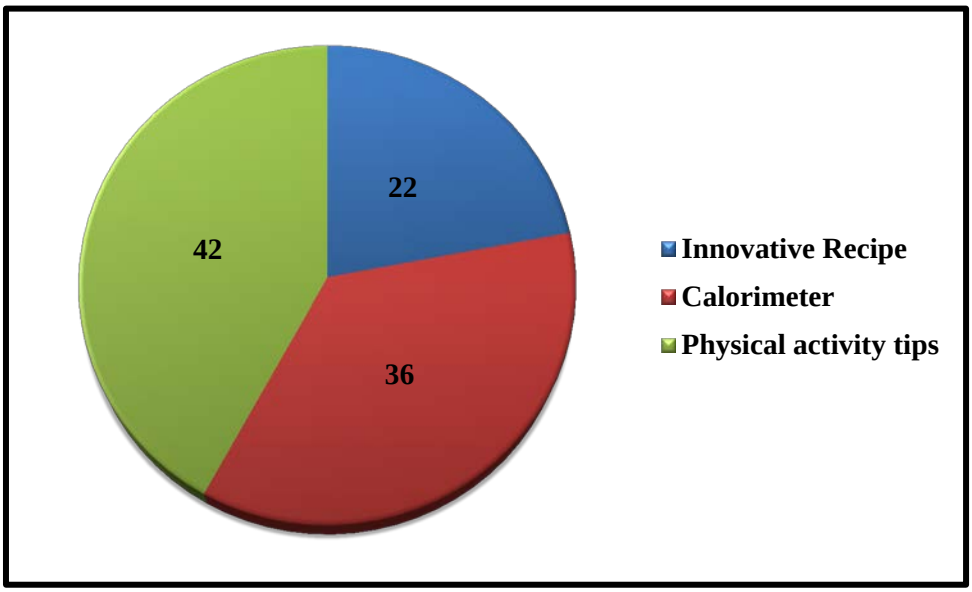


Table 5.13: Glimpse of the menus modified by schools based on the suggestions of the research team

Previous	Modified
Biryani and raita	Mix vegetable biryani , raita and furit
Pavbhaji	Pavbhaji with whole wheat bread and chaas
Idli/ sambhar	Vegetable idli, chutney and sambhar
Dal dhokli	Dal dhokli with peanuts and fruit salad
Cheese veg sandwich	Mix vegetable sandwich with chutney and whole wheat bread
Mutter paneer and roti	Vegetable paneer paratha and curd raita
Chhole puri	Chhole puri and mix fruit
Fried cutlet and chutney	Mixed flour cutlet, chutney and salad
Veg paratha and green chutney	Vegetable handwah and chutney
Burger and ketchup	Vegetable burger, wheat bread and soup
Chinese noodles and Manchurian	Atta noodles, salad and soup

**Based on the canteen evaluation report submitted to the schools, certain modifications were made in the menu by few schools*

STRENGTHENING OF THE CURRICULUM (MESO SYSTEM): The "In School Activities" helped in strenghtening learning and teaching (pedagogy) on topics such as food groups, nutrients obtained from food, importance of nutrition, health and communicable diseases, sanitation and hygiene. Science teachers took responsibility of organizing the health and nutrition projects in schools under the programme.

IMPROVEMENT IN THE SCHOOL PHYSICAL ENVIRONMENT (MESO SYSTEM): One school initiated the school gardening project helped by the researcher based on the FAO's, "School Kitchen Gardening" project guidelines (http://www.navrachana.org/navrachana/). This project was well appreciated and was awarded 3rd position at a National competition.

INITIATION OF "SPORTS CLUB" (MESO SYSTEM): Though all schools offered variety of sports in different combination packages depending on the availability of space, facilities and sports expert. Physical education was not considered seriously in schools and children used it as a free time for gossip or in unorganized games.

By end of 2 year intervention, 7/10 schools took sincere steps forward to develop their sports club. One such school was selected to assess the impact of "Active Sports Club" on the nutritional status of the participants which is presented in the next section of results.

Encouragement by the schools, support from the parents and awareness by our team resulted in enrollment of 658 children in their respective school sports clubs and the number increased to 860 by the end of the project. Timing and range of activities undertaken in the sports club varied in each school.

However, the sport teachers themselves took interest in conducting the activities. Children opted for different games (Cricket, Volleyball, Basketball, Football, etc.), marshal arts, aerobics and yoga based on their likes and interest. One school initiated yoga sessions in the school for the entire quarter. *https://sites.google.com/a/navrachana.edu.in/amoh/activities-at-nvv.*

Table 5.14: Sports Club activity details

Sr. No	School Name	Timings	Frequency
1.	The Mother's School	5:00 – 6:00 pm	3 days/week
2.	Bright Day School, CBSE Unit	4:00 – 6:00 pm	2 days/week
3.	Bright Day School, GSEB Unit	7.30 – 8:30 am	6 days/week
4.	Delhi Public School	2:00 – 2:30 pm	3 days/week
5.	BhartiyaVidyaBhavans	2:00 – 2:30 pm	3 days/week
6.	Navrachna	6:30 – 7:30 am	3 days/week
7.	NavrachnaVidyaniVidyalay	8:00 – 8:30 am	5 days/week

COMMUNITY CONTACT MEASURES (EXO SYSTEM): These were initiated via school websites, newsletters and participation in competitions.

1. **SCHOOL WEBSITE** – The yoga activity that was initiated by one of the school as part of "MARG", was uploaded on the school website for informing the parents about the new beginning. Navrachna Vidyani Vidyalay: *https://sites.google.com/a/navrachana.edu.in/amoh/activities-at-nvv*. This helped in informing parents as well as others who visited the school website for general information.

2. **SCHOOL NEWSLETTERS** – The "MARG" activities were published in the newsletter / annual school reports in 80% (8 out of 10) schools; thus informing the parents.

3. **THE LEAAD INDIA PROJECT** – One of the 10 schools participated in a National level project initiated by "Naman Consultancy". The project aimed at spreading awareness on "Harmful Effects of Fast Food Consumption" in communities through talks. Also the school stood 2nd in the competition (Annexure 11).

FELICITATION

1. **AWARDS AND CERTIFICATES:** All students who were declared winners of various activities by the respective judging jury were awarded winners certificates (Ist, 2nd and 3rd Prize). The principal investigator of "MARG" project Dr. Vanisha Nambiar (Image 5.29 – 5.32) awarded the "peers" during the school assembly. They were given certificate of appreciation for their good work (Annexure 12) at the end of the 2 year "MARG" program by the. Overall, 542 certificates were distributed to the winners indicating the positive outcome and participation of the "MARG" activities among children.

2. **LETTERS OF APPRECIATION BY THE SCHOOL:** All school gave a letter (Annexure 10) of appreciation and their feedback about the "MARG" project to the researcher. The major highlights of these letters were:

- The school principal and management readily accepted the evaluation reports submitted to them and 60% schools made efforts to modify their services.
- Healthier modifications were made in the menus of 50% school canteen based on the suggestions made in the school reports.
- Sports club was initiated in 70% schools in which organized sports activity were conducted. In 3 out of these 7 schools, the sports club was conducted post school hours.

- Capacity building of peer teachers and students to conduct activities under "MARG" which were sustainable and can be continued in the school curriculum.
- "MARG" activities were highlighted in the school newsletters and in 2 schools on their website.
- Request to continuing "MARG" and its activities and maintain a good association with the schools.

TO SUM UP

The Socio Ecology Model was successful in articulating various factors determining a child's growth and development. It provided an opportunity to develop and implement innovative programme in the school setting using various MICRO, MESO and EXO systems.

- More than 50 interactive activities were organized within the school setting.
- The NHE was delivered using print and electronic media wherein the colourful booklet and posters were well appreciated.
- More than 6000 children, 2000 parents and 500 teachers could be sensitized through "MARG".
- Quite many community outreach activities such as exhibitions, rally and recipe competitions were conducted.
- "Peers" trained under "MARG" were able to sustain the program in the school setting even in the absence of the researcher.
- Assessment of the activities done by various jury members, and winners were awarded certificates, thus, education was imparted in play-way method to children with the help of "peers", which made learning a very positive experience.
- Capacity building of parents could be achieved successfully.

- The school – MESO system initiated several improved school services such as sports club, modified menu at school canteen and planning of extra-curricular activities as a result of "MARG" intervention.
- Several integral elements of the SEM were successfully implemented and executed in the programme "MARG". These were **Intrapersonal Factors** (changing characteristics of the individual, such as knowledge, attitudes, skills or intention to comply with certain behavioral norms); **Interpersonal Relationships** (relationships with family, friends, neighbors, coworkers and acquaintances are important influences on the health behavior of individuals); **Organizational Factors –** (schools used to support behavioral change and have positive effects on the health of their members) and **Community Factors –** (face-to-face groups of parents and neighbours as "mediating structures," and provide support and resources.
- Though no public policies were made, the activities of programme "MARG" were disseminated through the school websites, annual magazines and newsletters. Health and Nutrition became an integral part of the schools.

LIMITATIONS

- Being a large longitudinal study, robust quantitative measures to assess the individual behavior changes could not be assessed.
- Due to varying examination schedules in each school, the investigator failed to conduct similar activities simultaneously in all 10 schools.
- Even a well-designed planner did not work out successfully every time. Other responsibilities on the peer teachers affected their punctuality and dates of the scheduled project activities.
- All ten schools had a very distinct culture, thus activities had to plan keeping the background in mind. Eg: typical Gujarati culture in schools such as Bright (CBSE/GSEB), Mothers and Shreyas; Children with

special needs in Mira- the happy school; Children from all ethnic groups in schools such as Navrachna, Vidyani, DPS and Bhavans and children with Army culture in Kendriya Vidyalaya.

- Repeated training and monitoring was required for display of posters and banners, reminder for upcoming activities, managing the logistics during health camps etc.
- Using the MESO and MICRO systems, all activities were planned and executed during school hours (In-School), thus large scale programmes for through the EXO systems could not be planned.
- Unlike the MICRO and MESO systems which were institution based and had 100% participation, there was non-uniform participation from the parents (EXO system) for each school.

FUTURE SCOPE OF WORK

- The results of this section can be used to regulatory policies, procedures and laws have been passed (national, state or local) to help protect the health of communities. Healthy school initiate programmes can be initiated based on the SEM to focus on the reduction of the rising burden of NCDs and dual burden of malnutrition.
- The results of this section intended to stimulate debate about how communications can most effectively influence behavior. The model activities which were very interactive, easily conducted during school timings with the help of "peers" can contribute to our overall goal of helping to develop ever more effective and efficient government communications.
- There is a need to develop healthy school canteen policies.
- School based policy needs to be developed to promote and encourage students, school authorities as well as parents to increase physical activity via "Sports Club" in schools which enables before or after school moderate to vigorous physical activity.

- Need to promote school based nutrition counselor and counseling services for students, teachers and parents.
- NHE through a social networking site such as facebook, whatsapp and twitter can be used for generating awareness at MESO and EXO systems.
- Need to strengthen online nutritional consultancy at the MICRO systems.

DISCUSSION

"You can do anything with children if you only play with them"
Prince Ottovan Bismarck

Play-way teaching is the best method to educate and motivate children to change their behaviour. "MARG", developed – executed and coordinated using Socio Ecology Model of behaivour change incorporated innovative strategies to impart education. It focused attention on the individual as well as the school, parents and community as the confounding social factors; because improved socio-economic conditions and accessibility alone does not necessarily improve the health dimensions, especially among children (Singh, 2010). Instead tailor made health education imparted with social support brings visible behaviour changes (Bushy et al., 2004).

"MARG", developed as per the theory of SEM, explains the importance of modifying an individual's ecology for creating an environment that supports the desired behaviour. As per Hesketh et al. (2011), social and environmental barriers such as: lack of correct information, poor awareness, contradiction between knowledge and behaviour, lifestyle balance, local environment, myths, roles of the school and family affects the adoption of healthy behaivour.

Bourdeaudhuij et al. (2006), reports the influence by personal, family, institutional and community factors on consumption of healthy food such as fruits and vegetable among adolescents. Similarly if essential changes are made in the school food environment, it affects the food offered in the school, which further determines the nutritional value of the food, purchased by the children (Snelling and Kennard, 2009). Modifying menus at school canteens showed similar changes under "MARG".

After the sensitization lectures given to parents under "MARG", they reported of being unaware about concepts such as: balanced diet, food groups and its nutritional relevance, innovative ways of preparing healthy and balanced recipes, etc. due to which they were unable to provide nutritious food to their children. Sharma et al. (2005), who states that even in well to do Indian families the adolescents do not consume quality nutrition, support this finding.

Though parents and students covered under "MARG" were aware about the benefits of PA, yet participation in physical activity was insufficient due to poor infrastructure, safety and appropriate physical environment (Vaz, 2009). Thus, clearly there is a need for health promotion policies in schools for students, parents and teachers concerning diet and exercise (Jadhavji and Esther, 2006). Under the present study, no public policies were made, yet activities of "MARG" were disseminated through the school websites, annual magazines and newsletters.

"MARG" incorporated comprehensive approach such as upgrading the curriculum, capacity building of student leaders, training teachers, making healthy alterations within the school environment; especially the school canteens, involved parents and outreached the communities. Different combinations of such elements among few "In School" programs viz CATCH (US), Urban Nutrition Initiative (Philadelphia) and SPARKLE have shown promising results (Active living, 2003); thus supporting the fact that "MARG" can be sustainable and replicable in other schools of Vadodara.

Feedback of "MARG" at the Exo level shows a positive response from parents and community as they work out to be the main change mediator in behaviour related interventions (Golan and Crow, 2004). Involvement of parents and community is crucial for sustaining a healthy environment, modeling of healthy eating and activity patterns, and improvement in the child's practices (Lissau, 1994; Griffin, 2006). Modifying the school food

environment by involving parents supported by curriculum based NHE have shown to improved decision making in selection of healthy food by the children (Winson, 2008).

Wansink, 2013 has described in the "CAN" approach how simple and practical tips can be adapted by the parents to make health and nutrition behaviour interesting, attractive and feasible; just as implemented in "MARG" the parents were given operational concepts for assisting their children in applying their learning's into practices at family level.

"MARG" was developed as a "system approach" which focused to examine multidirectional interventions on behaviour of children; which proved to be effective in addressing feedback loops between the caregivers (parents) and practitioners (schools and teachers) (Huang et al., 2013).

Thus there is a continual list of various school based interventions and programmes of varying duration that have adopted a combination of approaches. However, comprehensive approach has been the most rewarding and sustainable of all. National guidelines of holistic school health programme or universalization of coordinated school health strategies can go a long way in cost effective prevention of malnutrition epidemic in developing country like India. Moreover, it also gives an opportunity to promote physical activity within school setting.