CHILDHOOD OBESITY PREVENTION INTERVENTION AND POLICY IN
THE MEXICAN SCHOOL SYSTEM

by

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A thesis submitted to School of Kinesiology and Health Studies in conformity with
the requirements for the degree of Doctor of Philosophy

Queen’s University
Kingston, Ontario, Canada
September, 2013

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ABSTRACT

Overweight and obesity in Mexican children substantiates the need to identify effective strategies and policies to address this problem. Instituto Nacional de Salud Publica (INSP) designed and implemented a randomized control trial (RCT) to assess an ecologically-based intervention program to modify the school environment to promote healthy lifestyle behaviours in children. The objectives of this thesis are to describe the design and impact of this RCT, to examine the program content through an ecological approach, and to examine policy activities that have been informed by the RCT findings. Four manuscripts address these objectives. Manuscript one is *Promoting a Healthful Diet and Physical Activity in the Mexican School System for the Prevention of Obesity in Children: Rationale, Design and Methods*. It describes the rationale, design, and methods of the two-year INSP-Secretaria de Educacion Publica (Secretary of Public Education, SEP) RCT. Manuscript two is *Impact of a School-based Intervention Program on Obesity Risk Factors in Mexican Children*. It reports on the environmental impact of the INSP-SEP intervention by comparing 16 intervention schools with 11 non-intervention schools. Results showed increased availability and food intake of healthy foods with a concomitant decrease in unhealthy food availability in intervention schools/children. Manuscript three is *An Ecological and Theoretical Deconstruction of a School-based Obesity Prevention Program in Mexico*. It reports on an assessment of the integration of ecological principles and theoretical constructs in the school-based behavioural change/obesity prevention intervention carried out by the INSP-SEP. Results showed that 32 intervention strategies were implemented in the school setting to engage target-groups; the most used SCT construct was Reciprocal Determinism. Manuscript four is titled *Quality and Implementation of the Nutrition and Physical Activity School Policy Guidelines in Mexico City*. It assesses the quality and implementation conditions of a policy and reports on the implementation and the uptake of the national school policy to prevent obesity in Mexico city through a policy analysis, WHO School Policy Framework (SPF) and indicators informed by the national policy. Findings showed that not all of the 10
implementation pre-conditions were met; School Guidelines mostly complied with SPF but were not fully implemented within our sample.
CO-AUTHORSHIP

The co-authors of the manuscripts presented here are Dr. Lucie Lévesque (co-author of all four manuscripts within this document); Ines Gonzalez-Casanova, Deborah Salvo, Ana Islas, Sonia Hernández-Cordero, Anabelle Bonvecchio (manuscript 1); Ian Janssen, Nancy Jennings-Aburto, Fabricio Campirano-Núñez, Nancy Lopez-Olmedo and Tania Aburto (manuscript 2); Juan Rivera-Dommarco (manuscripts 1 & 2); Lucie Richard, Margaret Cargo (manuscript 3).

This manuscript has been accepted for publication in Salud Publica de Mexico for the Special Edition: Community Interventions and Obesity Prevention in Children and Adults. Margarita Safdie was responsible for conducting background research, contributing to the design of the study, coordinating the study, supervising the data collection, and writing the manuscript. Dr. Lucie Lévesque proposed the idea for a methods paper, provided guidance on the intellectual content of the manuscript, and provided extensive editorial assistance during the writing. Dr. Ines Gozales-Casanova provided relevant information regarding overall description of the interventions; Dr. Deborah Salvo provided relevant information regarding the physical activity domain; Drs. Ana Islas and Anabelle Bonvecchio provided relevant information regarding the overall implementation of the education and communication intervention, as well as, evaluation of behavioural change in children. The mentioned authors were researchers at the National Institute of Public Health (INSP) in Mexico, where the research was carried out, and participated in the data collection process. Dr. Sonia Hernandez provided relevant information on the description of the sample and provided important revisions to the content of the manuscript; Dr. Juan Rivera was the PI of the research project in Mexico and was responsible for leading the design of the study, providing guidance on the content of the manuscript and critical intellectual reviews of the manuscript.
Manuscript two: Impact of a school-based intervention program on obesity risk factors in Mexican children. This manuscript has been accepted for publication in Salud Publica de Mexico for the Special Edition: Community Interventions and Obesity Prevention in Children and Adults. Margarita Safdie was responsible for conducting background research, contributing to the design of the study, coordinating the study, supervising the data collection, developing the research question, analyzing data, interpreting the results and writing the manuscript. Dr. Nancy Aburto was responsible for contributing to the study design, leading the PA data collection and analysis and contributed to the manuscript content; Dr. Lucie Lévesque provided extensive guidance and critical intellectual content of the manuscript; Dr. Ian Janssen provided extensive guidance on the obesity prevalence and BMI analysis, assisted in the interpreting of results and provided critical intellectual content of the manuscript. Fabricio Campirano-Núñez supported in the PA data cleaning and supported interpreting the results; Nancy Lopez-Olmedo and Tania Aburto at the INSP assessed the dietary variables and supported the interpreting of results; Dr. Juan Rivera-Dommarco was the PI of the study in Mexico and was responsible for the conception of the study and provided critical revisions for intellectual content of the manuscript.
Manuscript three: An ecological and theoretical deconstruction of a school-based obesity prevention program in Mexico. This manuscript has been submitted to the International Journal of Behavioral Nutrition and Physical Activity. Margarita Safdie co-developed the research question, was responsible for conducting background research, collecting the data, leading the statistical analysis, interpreting the results, and writing the manuscript. Dr. Margaret Cargo and Dr. Lucie Richard were responsible for assisting with the design of the study, and providing training on the IAP. Dr. Lucie Lévesque was co-responsible for directing the study design and research questions, providing guidance on the data collection, providing guidance on the interpretation of results, providing critical intellectual content to the manuscript and extensive writing of the manuscript discussion.
Manuscript four: Quality and Implementation Assessment of the Mexican National Nutrition and Physical Activity School Policy Guidelines. This manuscript will be submitted to Health Promotion International. Margarita Safdie co-developed the research question and was responsible for conducting background research, design of the study, collecting the data, leading the qualitative analysis, interpreting the results, and writing the initial manuscript. Dr. Lucie Lévesque was the nominated PI of the study responsible for conceptualizing the study design and research question, providing guidance on the data collection, supporting the qualitative analysis and interpretation of the results, and providing critical intellectual content to the manuscript.
ACKNOWLEDGEMENTS

I would like to express my gratitude to the National Institute of Public Health (INSP) research team and field workers who participated in the RCT study; this research would not have been possible without all of you. Dr. Juan Rivera at the INSP was the Principal Investigator of the Mexico City RCT research study and I would like to thank him for providing me with the data and his support for doing the PhD.

I am also grateful to the CAMBIO (Canada and Mexico Battling Childhood Obesity) project in Canada who invited me to be part of their family. Thank you Donna Ivimey, Gabriela Ibarguchi and Dr. Ian Janssen for your support and guidance in this endeavor.

I would also like to extend my sincere thanks to my supervisor Dr. Lucie Lévesque for her mentorship. Lucie, you challenged me intellectually and helped me grow as a student and researcher, and I am grateful for your feedback, guidance, time and the numerous opportunities you gave me as I earned my PhD.

In addition, I want to express my gratitude to the School of Kinesiology and Health Studies at Queen's University, to all my friends from the SKHS 4th floor lab, and to my lab colleagues, both past and present, who have supported and accompanied me over the last four years.

My PhD has been an important step in a life journey that would not have been possible without emotional support from many people. To my family and friends in Canada, to my family and close friends in Mexico, thank you all for your support over the past five years and indeed, for your support throughout my life.

The research projects were carried out with generous support from numerous agencies, including the International Life Science Institute (ILSI); the Pan American Health Organization (PAHO); the Consejo Nacional de Ciencia y Tecnologia (CONACYT-Mexican Council for Science and Technology); the Secretaria de Salud (SA-Mexican Secretary of Health); and, the Canadian Institutes for Health Research (CIHR). I received further support for my doctoral
studies from CONACYT; Fomento de Investigación y Cultura Superior A.C. (FICSAC-Association of Research and Culture Promotion); CIHR; and the CAMBIO Project, the Global Health Research Initiative (GHRI), a collaborative research funding partnership of the Canadian Institutes for Health Research, the Canadian International Development Agency, Health Canada, the International Development Research Centre and the Public Health Agency of Canada.
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GLOSSARY

AFSEDF- Adminsitraciön Federal de Servicios Educativos del DF. Office of education services in charge of the decisions taken in elementary schools at the federal level; officials are not elected but designated by the SEP Minister.


DEGOSE- Direcccion General de Servicios Operativos. Operative office of the Elementary schools; this office is part of the SEP at the central level. This is where the permissions to intervene and the negotiations with the SEP were held. This office depends on the AFSEDF at the federal level. The officials are not elected, but designated by the head of the SEP.

DGEF- Direcccion General de Educacion Fisica. Operative office of Physical Education, located within the AFSEDF at the federal level. The officials are not elected, but designated by the head of the SEP.

DPAS- Global Strategy on Diet, Physical Activity and Health endorsed by the World Health Assembly.


OWO- Overweight and obesity.

PE teachers- Physical Education teachers designated by the DGEF, staff position.

Representative of the Canteen Committee- Person in charge of managing the money from sale and responsible for adequate functioning of the canteen at the school level.

SA -Secretaria de Salud- Secretary of Health. Federal government authority with cabinet representation and responsibility for overseeing the development and implementation of national health policy system and standards in México. The Minister of Health is not elected but designated by the president.
School Canteen Committee- committee that makes decisions about the canteen such as sale prices, selection of the vendors, and selection of products to sale. Formed by school teachers and parents (voluntary position).

School Context Action Program- Programa de Accion en el Context Escolar. Operative plan to implement the Mexican National Guidelines for Healthy Eating in Schools

School Council for Social Participation- Consejo Escolar de Participacion Social. Social and school council that is responsible for ensuring conformity of standards among the canteen committee inside schools, monitoring food availability, promoting physical activity, and addressing the controversies that may arise regarding the availability/management of food in schools.

School Principal- Principal of the school imposed by the AFSEDF, staff position.

School Vendors- Independent street vendors who are selling food items at the school during recess time. They offer their products at the school as long as they follow the regulations imposed by the Canteen Committee.

SEM- Socioecological model.

SEP – Secretaria de Educacion Publica- Secretary of Public Education. Federal government authority with cabinet representation and responsibility for overseeing the development and implementation of national educational policy and school standards in México. The Minister of Education is not elected but designated by the president.


Technique school council meetings- Meeting held at school the last Friday of every month with all the teachers and school staff. In these meetings school authorities discuss academic, labor, and important administrative issues.

UGSP- Unidad de Gestion Supervision y Programacion. Office of the SEP at the municipal level, this office deals with the issues of the schools that belong to a specific geographic
area. The main function of this office is to supervise the schools performance. This office depends on the AFSEDF and the DEGF.
PROLOGUE

My journey towards the PhD began in Mexico where I worked as a Researcher and Head of the Department of Community Nutrition at the Research Center for Nutrition and Health (CINyS) at the National Institute of Public Health (INSP). During my last four years at the INSP I was part of a team that designed, implemented, and evaluated a set of ecological school-based interventions in Mexico City schools and 12 Mexican states. Formative research assessed student health related behaviours and the environment within the Mexican School System and was used to inform the design of a comprehensive initiative to prevent childhood obesity in schools. This program was then tested using an RCT design. I was the research coordinator for this project, and oversaw the work of nutrition, physical activity and communication evaluation teams of data collectors. Just as this data collection was wrapping up, I was recruited by the CAMBIO (Canada - Mexico Battling Childhood Obesity) group to pursue my doctoral studies at Queen’s University. CAMBIO is a multidisciplinary, international network of investigators participating in a project to enhance research capacity in the field of Childhood Obesity in Mexico. This research initiative between Canadian and Mexican institutions aimed to prevent childhood obesity and strengthen research ties between Mexico and Canada. Funding for the project was provided through a Teasdale-Corti Team Grant, from the International Development Research Centre, Canada, on behalf of the Global Health Research Initiative. This network offered me the financial opportunity to undertake my PhD and to benefit from the mentorship of experts in program evaluation, epidemiology, and health promotion. With support from the INSP and Dr. Juan Rivera, the PI of the RCT, I was allowed to use the data that had yet to be analyzed for my thesis. Results from this research have already informed national obesity prevention initiatives in Mexico. For instance, in 2010, a national policy to address obesity was launched in Mexico. In my time at Queen’s I contributed to a grant application to CIHR that proposed to assess the impact of the national policy. We were successful in getting the grant and manuscript 4 in this thesis is the first paper resulting from this work.
CHAPTER 1: INTRODUCTION

Many low- and middle-income countries like Mexico are now facing a "double burden" of disease. While they continue to deal with the problems of infectious disease and undernutrition, they are also experiencing a rapid increase in nutrition related non-communicable disease such as obesity and overweight. According to national representative surveys in Mexico (ENN 1988, ENSANUT 2006, ENSANUT 2012),\(^1\)\(^2\)\(^3\) the overall prevalence of malnutrition in young children has decreased and the rates of overweight and obesity have increased in children from all age groups, all socio-economic strata, all regions, both urban and rural areas, and among both indigenous and non-indigenous population’s in Mexico.\(^1\)\(^3\)\(^4\)

These epidemiological shifts have been associated with changes in lifestyle patterns resulting from the rapid process of urbanization, economic growth, and technological innovations to produce food at low cost especially in lower-middle income countries like Mexico.\(^5\)\(^6\) Changes in lifestyles include modifications in dietary food intake patterns such as increased consumption of energy-dense products (including beverages), reduced consumption of fruits and vegetables,\(^7\)\(^8\) and reductions in physical activity.

The negative implications associated with child overweight and obesity are extensive, particularly when the conditions are observed at an early age. There are several physiological (i.e., diabetes), psychological (i.e., depression), social (i.e., stigma), and economic consequences of childhood obesity.\(^9\)\(^11\) When overweight and obesity are present in early childhood, risk factors are carried and expressed for a longer period of life.\(^9\) Evidence from the US suggests that children born today have a reduced life expectancy due to obesity and its complications.\(^9\)\(^12\)

In Mexico, obesity in children has been a public health concern since 1999 when results from the National Health and Nutrition Survey showed that the prevalence of unhealthy weight (overweight and obesity together) in children was 18.4%.\(^13\) One decade later, the prevalence had increased to 26.1% (more than a 33% increase),\(^2\)\(^3\) warranting the implementation of a comprehensive national strategy.\(^14\)
Several researchers\textsuperscript{15,16} have suggested that using the socio ecological model (SEM) represents an appropriate strategy to fight obesity given the complexity of the problem, especially in children who are exposed to environments that they are unable to control. The SEM recognizes reciprocal causation between the individual and the environment, focusing on the nature of people’s transactions with their physical and socio-cultural surroundings to influence behaviour.\textsuperscript{17-20} Many scholars have contributed to the development and evolution of SEM.\textsuperscript{19,21,22} This model is widely used and accepted for guiding interventions in public health and community settings.\textsuperscript{23}

There is convincing evidence\textsuperscript{24-26} that school-based interventions are a recommended way to reach children with a potential to prevent obesity in this population. Given that most children spend one third of their day at school on a school day, and that local governments typically have a mandate to offer a supportive environment to children, schools represent an important setting in which to promote healthy lifestyles.\textsuperscript{27}

In 2005, researchers from the Instituto Nacional de Salud Publica (INSP-National Institute of Public Health) characterized the school environment in 12 schools of Mexico City with the aim to design, implement, and evaluate a strategy to provide evidence to foster policy change for creating school environments that support healthy eating and physical activity. Results from this formative research showed that the Secretaria de Educación Publica (Secretary of Public Education, SEP) in Mexico implemented a physical education program (PEP)\textsuperscript{28} in elementary schools nationwide that envisions physical education as a means to promote a healthy life. While the PEP offers information to students regarding an active lifestyle, this information has not been supported by behavioural guidance or complementary strategies until very recently. Moreover, according to research carried out by the INSP, the school environment in Mexico could be considered to be “Obesogenic”, not only because of restricted opportunities for physical activity, but also because of enhanced opportunities to consume energy-dense foods and beverages.\textsuperscript{29-32}
The dramatic rise in the prevalence of overweight and obesity in Mexican children and the prevailing obesogenic environment in Mexican schools substantiate the need to identify effective strategies to address this serious public health problem. Given that efforts to address this issue in Mexico are relatively new and given a lack of evidence about how to effectively intervene in schools to prevent childhood obesity, research is needed to improve and systematize these efforts to replicate successful experiences in the future.

In 2006-2008, the INSP designed and implemented a randomized controlled trial (RCT) to assess an ecologically-based innovative intervention program to modify the school environment to promote healthy lifestyle behaviours in grade 4-6 students. Strategies were designed according to a simplified ecological model,\textsuperscript{19} formative research,\textsuperscript{29,31} Social Cognitive Theory and \textsuperscript{18} the Theory of Planned Behaviour.\textsuperscript{33} The primary objective of the research was to assess the effectiveness of environmental and behavioural approaches to improve the environment, and eating and physical activity behaviours at school in order to prevent overweight and obesity in children. The intervention was implemented and evaluated using an experimental design in 16 schools in Mexico City; 11 comparison schools were also recruited.

In 2009, the Mexican Secretaria de Educación Publica and the Secretaria de Salud (SA-Secretary of Health) developed the Mexican National Strategy for Overweight and Obesity Prevention.\textsuperscript{34,35} The National Strategy includes school-specific recommendations and regulations related to PA, healthy eating, through the sale and distribution of food inside schools (ANSA). The School Guidelines\textsuperscript{35} were developed largely in response to findings from the previously described INSP RCT and following the model proposed by the WHO Global Strategy on Diet, Physical Activity and Health.\textsuperscript{24,36} The quality of the policy and its implementation were evaluated as a natural experiment in 20 Mexico City schools.

This thesis was designed to answer some of the questions arising from the lack of evidence about school-based interventions in Mexico. The objective of this thesis is to comprehensively report, in four manuscripts, results of actions carried out in “The Mexican
School System” by the INSP, the SEP, and the SA to promote a healthy school environment and student behavioural changes to prevent childhood obesity in Mexico.

This manuscript-style format thesis includes a literature review, four manuscripts, and a general discussion with conclusions. The literature review provides an updated review of the etiology and epidemiology of obesity in children and an overview of intervention approaches and strategies to prevent childhood obesity in school settings in Mexico and elsewhere. Manuscript one is titled Promoting a Healthful Diet and Physical Activity in the Mexican School System for the Prevention of Obesity in Children: Rationale, Design and Methods. It describes the rationale, design, and methods of the two-year INSP-SEP RCT. This paper has been accepted for publication at Salud Publica de Mexico. Manuscript two is titled Impact of a School-based Intervention Program on Obesity Risk Factors in Mexican Children. It reports on the environmental impact of the INSP-SEP intervention by comparing 16 intervention schools with 11 non-intervention schools. It also reports on changes to grade 4-6 student PA and eating behaviours over time and by intervention status. This paper has been accepted for publication in Salud Publica de México. Manuscript three is titled An Ecological and Theoretical Deconstruction of a School-based Obesity Prevention Program in Mexico. It reports on an assessment of the integration of ecological principles and theoretical constructs in the successful school-based behavioural change/obesity prevention intervention program carried out by the INSP-SEP. This manuscript is currently under review at International Journal of Behavioral Nutrition and Physical Activity. Manuscript four is titled Quality and Implementation Assessment of the Nutrition and Physical Activity School Policy Guidelines in Mexico City. It assesses the quality of the policy and reports on the implementation and uptake of the national school policy to prevent obesity in Mexico in 20 schools in Mexico city through the lens of the Hogwood and Gunn policy implementation schema, the WHO School Policy Framework and additional indicators informed by the national policy. This paper will be submitted for review at Health Promotion International. The four manuscripts are followed by a general discussion and
conclusions including a summary of the key findings, overall strengths and limitations, and public health and research implications.
REFERENCES


CHAPTER 2: REVIEW OF LITERATURE

2.0 Introduction

Obesity is defined as a complex multifactorial\(^1\) chronic condition that involves genetic, biological, environmental, and lifestyle aetiology.\(^2\) Overweight and Obesity is characterized by a positive energy balance, which occurs when caloric intake exceeds energy expenditure resulting in an increase in body fat stores and thus weight gain.\(^3\) Overweight and obesity (OWO) in school-aged children is on the rise in developed and developing countries. According to global evidence, the rising global prevalence has health, social, and economic implications, such as lack of productivity and the high medical cost of associated co-morbidities.\(^4\),\(^5\)

A growing body of research shows that the increased prevalence of obesity in most parts of the world has been influenced by changes in environmental factors that have influenced individual lifestyles and behaviours of individuals.\(^6\),\(^7\)-\(^9\) The globalization of the food industry, free trade agreements, and urbanization are all environmental factors that have transformed the way that people eat, drink, and exercise. Studies from the fields of epidemiology, health promotion, and health policy have shown that this dramatic rise in obesity cannot be attributable to individual factors alone; rather, individual behaviour is strongly influenced by environmental changes. Children are especially vulnerable, because they often lack the autonomy to engage in certain behaviours and to influence environmental conditions that shape their behaviour and promote energy imbalance. Therefore, interventions to prevent childhood obesity should include efforts to change the environmental conditions in which children spend much of their time.\(^7\),\(^10\),\(^11\)

The literature review presented in this chapter summarizes relevant issues in childhood obesity and reviews school-based interventions to prevent childhood OWO in the world and in Mexico. This literature review will provide an overview of the socio ecological model (SEM), which recognizes the interaction between individuals and their environment. I will describe how SEM has been used within different types of school interventions (environmental and multicomponent)\(^12\)-\(^14\) and argue that SEM should inform interventions to prevent childhood
OWO. Furthermore, this literature review will describe the school-based interventions in Mexico; which are in their infancy in practice and are poorly documented within the research literature. This literature review will provide context and rationale for my thesis dissertation, which intends to contribute evidence about school-based interventions to prevent OWO in Mexico.

2.1 Global obesity

In 2010 the World Health Organization (WHO) published data on trends in obesity among children worldwide using the 2006 WHO growth reference standards. Child OWO increased from 4.2% in 1990 to 6.7% in 2010, with projected increases to 9.1% in 2020. The WHO found that the problem of OWO is one of the most widespread and severe nutrition-related issues among preschool and school-aged children. Although there is wide variation in obesity rates between countries, in the last two decades there has been a relative increase of 65% of obesity in children in the developing world compared to 48% in the developed world. Thus, it is estimated that of the 43 million school age children with OWO in the world, 35 million are from the developing world.

In an analysis carried out by Janssen and colleagues that included 34 countries, OWO prevalence in children and adolescents was found to be high in many countries, and particularly so in North America, Great Britain, and the southern portion of western Europe. In Latin America and the Caribbean, the Middle East and North Africa, and the region of Central Eastern Europe/Commonwealth of Independent States, obesity prevalence has shown an increasing trend as countries emerge from poverty, such that OWO levels in these regions are now are as high as in the United States. The rate at which these increases have occurred is especially alarming.

Though childhood obesity is on the rise worldwide, developing countries are faced with the additional burden of coexisting under-nutrition. Children in the relatively affluent regions of a country are more likely to be obese than their rural counterparts, who conversely may not have enough quality nutrition for optimal growth.
2.2 Prevalence of obesity in Mexico

Mexico has one of the highest prevalence of obesity worldwide, not only in adults, but also in children\textsuperscript{21}. The prevalence of obesity in Mexico has been estimated from various nationally representative surveys.\textsuperscript{22} The national nutritional survey in 1999, which classified OWO in school-age children (5 to 11 years of age) according to International Obesity Task Force (IOTF) BMI age-sex criteria,\textsuperscript{23} found that the overall prevalence of OWO in school-age children was 18.4\%.\textsuperscript{22} In 2006, the national survey (ENSANUT 2006)\textsuperscript{24} found the OWO rate was 26.1\%, with the highest prevalence of OWO weight in girls (26.2\%).\textsuperscript{24,25} This represents an alarming increase from seven years earlier. The same survey showed that across the nation, the highest prevalence of unhealthy weight in school-age children was observed as 33.2\% in Mexico City, followed by 29.2\% in the Northern region, 26.6\% in the Central region, and 22.6\% in the Southern region.

In 2012, an analysis of tendencies between the ESANUT 2006 and 2012 using the WHO growth references showed that OWO in school-aged children decreased slightly from 2006.\textsuperscript{26} This suggests that the prevalence of OWO in children has become stable in recent years. Even though this finding might offer some hope that the situation is not worsening, the prevalence of OWO in school age children in Mexico is still very high and represents a public health challenge.

2.3 Consequences of childhood obesity

The obesity epidemic has extensive negative implications, particularly when the condition is observed at an early age.\textsuperscript{27} Childhood overweight carries numerous short- and long-term health risks; obesity at young ages causes disabilities and elevates the risk of fatal and nonfatal conditions.\textsuperscript{4} Children who are overweight or obese today experience obesity-related risks for a longer period of their lifetime compared to previous generations, and thus may not reach their full human potential.\textsuperscript{28}

Physiologically, childhood obesity can adversely affect almost every organ system and often has serious health consequences.\textsuperscript{3} Short-term consequences include cardiovascular diseases
such as diabetes, dyslipidemia, hypertension, insulin resistance, and fatty liver disease, all of which are associated with serious medical complications. Obese children might experience permanent biologic changes in cells, hormones and the brain, which in turn can affect metabolism. In Mexico, recent evidence has shown that obese school-aged children already present cardiometabolic risk factors and the metabolic syndrome. Moreover, obese children are up to six times more likely than lean children to have obstructive sleep apnea, which is independently related to the development of behavioural disorders, poor school performance in children, and poor quality of life later on as adults.

Many studies have focused on the long-term consequences of living with obesity from childhood into adulthood. This relationship has been well established in epidemiological studies. According to data from research studies in children found that obese children are twice as likely to become an obese adult compared to non-obese children. This means that almost half of obese school-age children (42 to 63%) will become obese adults. Moreover, a longitudinal analysis from the Bogalusa Heart Study has shown that obese children in the US have an increased risk of dying by middle age, and have a reduced life expectancy.

In addition to the physiological short and long-term damages, there are several psychological and social complications related to OWO, such as the reduced ability to relate to family members and society. Psychological and clinical studies in children show that obese children tend to be socially isolated and have high rates of disordered eating, anxiety, and depression especially in adolescence, presumably due to body dissatisfaction and stigma. In school, obese children are exposed to bulling, loneliness, or low self-esteem, which in turn can also affect academic performance. Overall, obese children may have fewer opportunities to thrive and succeed in several spheres of life since they are stigmatized.

From a wider standpoint, OWO has broader economic impacts on health systems and societies. In developing countries, the obesity epidemic and its complications might decrease child development and jeopardize human capital. Some scholars have suggested that obesity and
its complications could fracture health systems, societies, communities, and families (by both reducing the work force and increasing the direct and indirect costs related to obesity risk factors).5, 11

2.4 Etiology of Obesity

The determinants of obesity are multiple and complex; 2-41 there is not a single determinant of obesity, but rather a litany of factors related to recent increases in children’s energy intake and decreases in their energy expenditure. Research shows that obesity derives from changes in individual behaviours (i.e., physical activity 42; feeding practices 43), which are shaped by the environment. The consensus among public health researchers is that changes in the biology of the individual cannot explain the rapid rise in obesity, and the explanation must lie in behavioural and broader environmental, policy, and societal changes. 1, 2, 11, 44-48 Research has documented significant lifestyle changes in middle income countries and a dramatic shift in how the world population eats, drinks, and moves. 7 These environmental shifts are characterized by an increased availability of energy-dense foods – which are high in fat, sugars, and salt, but low in vitamins, minerals, and other micronutrients – with a concomitant decrease in opportunities for physical activity caused by urbanization and modern forms of work, transportation, and leisure, and a lack of comprehensive policies to promote healthy lifestyles. 7, 11, 47, 49-51 Consequently, the obesity epidemic is not only based on individual (behavioural) factors, 52 but also on environmental changes occurring during the last 30 years. 53

2.4.1 Changes in food consumption in children

Within the last decade the literature has clearly established that processed foods (i.e., sweetened beverages 54, high fat, salty and sweet snacks 55), increased away-from-home food intake, and increased use of edible oils are becoming a major part of many people’s lives, resulting in overall higher energy intake and childhood obesity. 1, 7, 54, 56-58 Children today are consuming a diet high in animal fat, oils, and caloric sweeteners and low in legumes, grains, and other vegetables. 7
Research demonstrates that the children of today are living in an era of industrialization of the food environment where there is a greater variety of high energy-dense foods. These energy-dense foods are widely-advertised and available, cheaper, and larger than foods of previous eras. Most worrisome is recent evidence suggesting that this situation is mostly affecting low and middle income children of developed countries and all children in developing countries.

2.4.2 Changes in physical activity in children

Changes in the environment have also contributed to reducing children’s activity levels over the last three decades. It is well known that children today spend more time in inactive pursuits, such as watching television, playing video games, and using computers, than they do being physically active. There is evidence that inactive behaviours are important contributors to energy imbalance and thus, to childhood obesity.

Much research has established that children today are more inactive than children were 30 years ago. For instance, children these days spend less time playing outdoors in parks and streets, and walk or bike to school less frequently than in the past often due to safety concerns, traffic due to urbanization and long distances, or other changes to the built environment. Evidence also shows a decline in children’s physical activity levels at school over the past two decades. In the US, physical education (PE) at school has been cut back to make room for more academics. Moreover, research shows that the quality of PE classes has decreased due to constraints related to human and material resources and/or infrastructure. In Mexico, Aburto and colleagues found in a cross-sectional descriptive study that children in public schools engage in only 9 to 11 minutes of moderate to vigorous physical activity (MVPA) once a week during PE class. Through observation, Aburto and colleagues found that the main constraints to physical activity in Mexican schools were a lack of material to engage in PA and a lack of human resources such as PE teachers.
2.5 Nutrition Transition in Mexico

Given that this thesis will focus on interventions for preventing OWO among children in Mexico, it is important to situate the research in the broader historical and cultural context of Mexico. Mexico is experiencing an accelerated nutritional transition characterized by an epidemiological shift and a double burden of illness—that is, lingering malnutrition and increasing rates overfeeding coupled with decreased energy expenditure. Although the overall prevalence of malnutrition in young children leading to wasting has decreased over the last 20 years, stunting continues to be a concern according to the last national nutrition survey. Simultaneously, rates of OWO have increased alarmingly in the last decades in children of all age groups, all socioeconomic strata (SES), all regions, in urban and rural areas, and among indigenous and non-indigenous populations. In the US and Europe the increase of obesity has been associated with the effects of globalization and urbanization, which have led to faster changes in nutritional and lifestyle patterns. In a similar way in Mexico, these epidemiological shifts have been associated with changes in lifestyle patterns resulting from the rapid process of urbanization, economic growth, and technological innovations. Taken together, the epidemiological, environmental changes and its behavioural interactions have created an “obesogenic” environment (i.e., environment that contributes to obesity) in Mexico.

The environmental conditions in Mexico favour obesity in both adults and children. Environmental obstacles to living a healthy life include a lack of accessibility to high-quality food items for the majority of the population and restricted opportunities to engage in an active lifestyle. Moreover, a lack of policies to regulate food industry production, and child-oriented mass marketing campaigns promoting energy-dense food intake constitute additional obstacles to healthy eating patterns. Mexico’s food market is wide-open to American food industries through trade agreements such as North American Free Trade Agreement (NAFTA) and other commercial agreements. Transnational food companies are responsible for the major portion of sales of certain categories of foods in Mexico, such as sugar-sweetened beverages and sweet and
salty processed snacks.\textsuperscript{7} In México, probably more than in other countries of Latin America, the power of food industry corporations and a lack of legislative controls are allowing Westernized lifestyles (intake of high fat/sugar industrialized foods) to permeate Mexican society. This is due to the close relationship with USA and the high commercial exchange across the borders. Most worrisome is the increasing social acceptance of sugar beverages and sodas as necessary and desirable goods in Mexican households, a trend which has been observed in national surveys over the last 20 years.\textsuperscript{72, 74, 79} For instance, the purchase of soda in Mexican households has significantly increased from previous years according to the 2006 Income-Purchase Survey.\textsuperscript{79} Moreover, data from the National Nutrition Survey in 2006 showed higher consumption of energy-dense beverages, including sugared and non-sugared juices, in all children’s age groups compared to previous years. It has been estimated that 60\% of the total sales of these beverages are consumed by the 2-18 years age group.\textsuperscript{21, 79} The intake of industrialized sweet beverages is not a part of traditional Mexican food practices. The high intake of these beverages may be a reflection of environmental changes (i.e., globalized food industry and adoption of Western lifestyles) and the lack of comprehensive policies to regulate the access and marketing of sweet beverages to children in Mexico. The high intake coincides with the rise in obesity prevalence in children and adolescents. Thus the lack of policies and the environmental changes are affecting the obesity prevalence in Mexico.

### 2.6 Obesogenic environment in Mexican Schools

The school represents an important setting for children because they spend about one third of each weekday at school, interact with other children and influential adults, and are typically exposed to eating and physical activity opportunities while at school. According to epidemiological research carried out by the National Institute of Public Health (INSP), the public school environment in Mexico City can be considered to be “obesogenic”, not only because of enhanced opportunities to consume energy dense products, but also because of restricted opportunities for physical activity.\textsuperscript{80-82} With regards to food, this study revealed that schools lack
nutritional guidelines. Furthermore, the study found that students had five daily eating opportunities throughout their school day, and tended to favour high fat and sugar-laden foods and beverages. These foods may be brought from home, but most often are readily available for purchase from the school canteen or from food vendors that are allowed into schools.\textsuperscript{80, 82}

Findings from this study also revealed the limited availability of fresh produce (e.g., fruits and vegetables) and potable water in Mexico City’s schools. There are multiple factors that have created an obesogenic school environment. In addition to the negative influence of the food industry as described previously, children, parents, and teachers may lack knowledge about adequate nutritional practices and may have erroneous beliefs and negative attitudes about obesity prevention and healthy lifestyles. Moreover, broader social norms often support unhealthy practices, wherein caregivers provide money for children to buy food at school, teachers reward children with candy, and students are allowed to eat in the classroom throughout the day.\textsuperscript{80-82}

In regards to PA, the Secretaria de Educación Publica (Secretary of Public Education, SEP) in Mexico implements a Physical Education Program (PEP) at elementary schools nationwide, which envisions physical education as a means to promote a healthy life. While the PEP offers information to students regarding an active lifestyle, this information has not been supported by behavioural guidance or complementary strategies until very recently. Other shortcomings of the government PEP include a lack of incentives to motivate physical education teachers, materials, and appropriate areas for delivering PE classes. Furthermore, the PE class structure delivers only 9 to 11 minutes of moderate to vigorous physical activity (MVPA).\textsuperscript{69} In sum, Mexico faces a childhood obesity epidemic that requires an optimal combination of individual and behavioural interventions and programming approaches to promote healthy living opportunities.

\textbf{2.7 Socio ecological model (SEM) for addressing both individual and environmental influences of obesity}
The appeal of a Socio ecological model (SEM) for the promotion of health and the prevention of obesity is that it integrates strategies of behavioural change and environmental enhancement according to established theoretical frameworks. Socio ecological models recognize reciprocal causation between the individual and the environment, and focus on the nature of people’s transactions with their physical and socio-cultural surroundings. The SEM for health promotion is rooted in Bronfenbrenner’s human ecology approach. Bronfenbrenner described interactions resulting from the relationship between four systems and processes affecting human behaviours and human development: The microsystem, described as the interpersonal relations and social roles of a person in a given setting; the mesosystem, described as the linkages and development process of a person in two or more settings; the exosystem, described as the linkages and process of a person in two or more settings where one setting might influence the immediate development of the person; and, the macrosystem, described as the system that contains micro-, meso-, and exosystems.

Bronfenbrenner’s human development systems approach has been used as a framework in the development of several theories within health promotion and behaviour change research in the 1980’s and 1990’s. In the late 1980’s, McLeroy proposed an ecological model for health promotion that was founded on Bronfenbrenner’s model and several ideas from other scholars. The core concept of McLeroy’s ecological model is that intrapersonal, interpersonal, community, organization, and political influences on human behaviour constitute “targets” to be leveraged for behaviour change. Taken together, these can be used to guide a comprehensive intervention approach to promote health. According to McLeroy, Intrapersonal influences can be defined as characteristics of the individual, such as knowledge, attitudes, and practices; interpersonal influences can be defined as a person’s formal and informal social networks including family, colleagues, and friends. Organizational influences can be defined as social institutions with well-defined structures and rules for operation; community influences can be defined as entities,
networks and the physical environment; and policy influences can be defined as local, state, and national laws and policies.\textsuperscript{13}

In the 1990’s, Stokols conceptualized the idea of health-promoting environments, centering his work on describing the environment and the interaction between individuals and collective health problems. Stokols described health promotion as a broad dynamic transaction between individuals and groups in their socio-physical environments. Stokols introduced the idea that there are several types of environments within different societal dimensions that simultaneously influence health outcomes. He advocated for distinguishing between health outcomes according to their severity, duration, and overall importance to members of the society. In the mid 1990’s, there was growing appreciation for the value of multilevel, multi-targeted approach to health promotion.\textsuperscript{85, 86, 67, 83, 87}

In 1996, Richard and colleagues\textsuperscript{14} suggested an innovative way to operationalize the ecological model so that it could be applied to practical health promotion programs. This scheme is founded on Stokols’ notion of health promoting environments and uses McLeroy’s targets (as described above), and Miller’s Theory of Living Systems, which identifies the patterns of interaction between humans and their environments.\textsuperscript{88} Drawing from the Theory of Living Systems, Richard and colleagues identified four settings in which public health interventions can occur. Their scheme stipulates that targets can be engaged in one of four different types of settings: organizational (e.g., schools, businesses); community (e.g., neighbourhoods, parent associations); society (e.g., provinces, states); and supranational (e.g., the European Union). Richard and colleagues conceptualized the health promotion intervention strategy as the relationship that joins the targets intended for change with the intervention program\textsuperscript{14}. Multiple targets within a given strategy can be joined by either a direct transformation relationship, or by a networking relationship. The “ultimate target” of an intervention is most often individuals, referred to as (IND), who can be engaged proximally by the health promoter (HP) or intermediately via other targets (e.g., HP provides training to teachers so that they can encourage
healthy behaviours in children). A networking relationship is when the HP brokers a new relationship between two or more entities in order to influence the ultimate target. Network relationships can take the shape of different collaborative partnerships such as interagency alliances, community coalitions, informal cooperatives, and advocacy groups. These two types of relationships can be used in diverse combinations and might involve attaining numerous targets before reaching the ultimate target. Overall, the evolution of the SEM in the 1990’s served to highlight the importance of environments as a means of providing support for people to achieve higher levels of well-being. The use of a SEM that accounts both individual and environmental influences is recommended to guide interventions to enhance healthy eating and physical activity for obesity prevention.

2.8 Behaviour Change Theory

Given that intrapersonal and interpersonal factors are important targets for health behaviour change when using a SEM, behavioural theory is recommended to inform individual- and interpersonal-level interventions. Behavioural theory can help to better understand the nature of the problem addressed, describe the needs of the target population, and be used to formulate hypotheses on how to change health determinants and mediators. Social Cognitive Theory (SCT) and the Theory of Planned Behaviour (TPB) are two theories that have often been used to address eating and physical activity behaviour change.

2.8.1 Social Cognitive Theory

SCT postulates the relationship between humans and society as reciprocally determined, which suggests that humans and environments interact and influence each other. Bandura (1986) suggested that the environment and the individual are immersed in a ‘reciprocal determinism’ characterized by an ecological transaction. In this conceptualization, the environment is viewed as predisposing, enabling, and reinforcing of individual and collective behaviour. Figure 2.1 illustrates the SCT Conceptual Model.

Figure 2.1: Social Cognitive Theory Triadic Reciprocal Determinism
Bandura’s Triadic Reciprocal Determinism
SCT identifies cognitive factors as affecting and being affected by specific behaviours and environments. The “self-efficacy” (SE) construct is most prominent in SCT and is defined as the belief a person holds regarding their ability to successfully perform a specific behaviour under specific conditions. SE can be improved by performing a task repeatedly, by observational learning, by improving motivation, and by improving psychological responses (e.g., stress) to a desired behaviour. SE influences human feelings, choices, and motivations. Outcome Expectations, another key construct of SCT, represent the beliefs a person holds about the likelihood and of a behavioural consequence. Outcome expectations can facilitate or deter behaviour. Self-efficacy and Outcome Expectations can each account for behavioural variance, however, Outcome Expectations will not account for additional variance in behaviour above self-efficacy when expected outcomes are conditional on performance (self-efficacy) beliefs. In instances where expected outcomes are not conditional on performance beliefs, outcome expectations may add to the variance predicted by self-efficacy beliefs. Another important SCT construct includes behavioural capacity (BC) to engage in a change, which is the knowledge (what do to) and skills (how to do) related to a behaviour. BC is a pre-requisite for self-efficacy and self-confidence. Another important SCT construct is reinforcement (R), which describes ways to increase the recurrence of a preferred behaviour or to decrease an undesired behaviour. Reinforcement factors can be the provision of reward or incentive for positive behaviour or punishment for negative behaviour. Reinforcing forms include giving advice, feedback, or providing physical consequences. Other SCT constructs include Outcome Expectancies (the value placed on the anticipated outcome of behaviour or reward incentives), self-control (perception of one’s ability to control and regulate behaviour), and Emotional-coping response (strategies used by individuals to manage emotional situations). Understanding these constructs and the way in which they operate offers important insight into how behaviour can be modified through health promotion interventions. SCT has become a popular theory for designing health promotion, nutrition education and PA promotion programs.
Reviews of physical activity interventions\textsuperscript{94} and reviews of healthy eating interventions\textsuperscript{112} among children and youth demonstrate the prevalent use of SCT. For example, a recent literature review on the use of dietary education to prevent obesity found that SCT was the most used theory in schools. Although there is a lot of evidence to support the value of SE for enhancing healthy eating\textsuperscript{101, 102} and PA\textsuperscript{103-105} most interventions had limited measurement of the predictive value of SCT constructs taken together, and failed to clearly document whether changes in these constructs were a result of the intervention.\textsuperscript{97, 98, 101} Thus, in order to improve the application of theory, it is important to find out which constructs of that theory are working and to what extent. Other scholars have acknowledged the same limitations in the use of theories in the obesity prevention interventions.\textsuperscript{98, 101} Future researchers and intervention evaluators should develop robust instruments that measure the changes in theoretical constructs over time.\textsuperscript{101}

2.8.2 Theory of Planned Behaviour

The Theory of Planned Behaviour (TPB)\textsuperscript{95} is derived from the Theory of Reasoned Action (TRA). The TPB is based on expectancy value considerations and assumes that people make decisions in a reasonable manner as reasonable actors. This theory does not imply that people always take action or operate in rational or appropriate ways from an objective point of view, but rather that they make decisions that make sense to them. Thus, TPB allows researchers to discern the reasons underlying a behaviour by providing a framework for identifying and combining beliefs relevant to a given group.\textsuperscript{98} Originally, the TRA was predicated on the assumption that intention to act, based on attitudes (i.e., favourable or unfavourable judgments about given behaviours which are strongly influenced by beliefs and consequences) and subjective norms (i.e., perceived as social pressure), were the most immediate determinants of a behaviour. However, Ajzen refined the theory by including the perceived behavioural control construct (i.e., perception of control over the behaviour) that can also affect the intention to act (see Figure 2.2).\textsuperscript{95} Therefore, within the TPB, intention to act (behavioural intention) is not only based on the attitudes towards behaviour and associated normative beliefs, but also behavioural
control as a third influence. The inclusion of this construct recognizes that a person will act if she or he perceives herself/himself to have control and power over the behaviour.

According to TPB, a person is most likely to intend to adopt, maintain, or change a behaviour if they believe they will benefit, if they perceive the behaviour as socially desirable, and if they feel control over their ability to perform the behaviour. This theory has been studied extensively in the field of obesity prevention to investigate influences of food choice and dietary behaviour and in the field of PA to investigate attitudes and intentions towards different PA activities. Recent research shows that TPB has been used effectively to design obesity prevention interventions, specifically focused on PA and dietary behaviours in children in school settings and targeted to parents. A meta-analysis examining the relationship between TPB constructs and PA across 72 studies found that behavioural intentions and perceived behavioural control accounted for the majority of variance in PA change. With regards to
dietary behaviours, attitude predicted most of the behavioural variance, with lower proportions predicted by perceived behavioural control and subjective norms.\textsuperscript{108}

Behaviour change theories constitute an integral part of any SEM based intervention program as they lay out the pathway to enhancing individual level change. The next section outlines the leverage points for influencing changes at the environmental levels of the SEM.

2.9 Policy

Policies are a primary mechanism for making environmental changes and may include formal and informal rules, laws, and regulations.\textsuperscript{87, 109} Policies are seen as mediating structures between the individual and the environment. Depending on the political context, policy can either inhibit or enhance the structures and social norms of a community that promote healthy activities.\textsuperscript{47, 50, 53, 110}

Unfavourable laws, regulations, lobbying by industry groups, and corporate practices are part of the environmental landscape that influences individual’s unhealthy behaviours.\textsuperscript{10, 87, 110} Children’s behaviours and attitudes are influenced by policies that are largely out of their control. According to health promotion scholars, strong political will and adequate policies are needed to enforce healthy behavioural change.\textsuperscript{47, 87, 111}

Government policies can support healthy environments by limiting unhealthy environmental influences; for instance, policies that regulate food production and limit food marketing targeted to children. Government policies can also enhance positive influences; for instance, policies that reduce prices for healthy foods, regulate marketing and food labelling, and/or guide food intake and PA at school,\textsuperscript{53, 35, 111} policies supporting parks and recreation programs, active transportation, and the provision of healthy eating and active lifestyle resources in schools and workplaces.\textsuperscript{109, 112} Although policies do not guarantee better environments for physical activity and healthy eating, they may be necessary and useful for generating political will and public support in favour of obesity prevention.\textsuperscript{10, 113}
The benefit of including policy components in a comprehensive intervention program for obesity is that, if successfully implemented, policy changes have the potential to affect every person in that environment.\textsuperscript{109,112} Effects are purported to last as long as the person is in the environment or the policy is in effect.\textsuperscript{114} Therefore, a promising strategy to address OWO in children when using SEM, is to leverage policies to promote healthy eating and PA in children.\textsuperscript{10,52,109,111-113}

2.10 Schools as a setting for obesity prevention in children

The school is an important feature in the social environment of children not only because they spend about one third of their weekday there, but also because the school setting offers continuous interaction with other children and influential adults. Schools often play a formal role in delivering health and physical education, potentially influencing knowledge and attitudes towards health habits.\textsuperscript{115,116} From an ecological perspective, the school setting can offer several opportunities to impact healthy eating and PA at different levels of influence (intrapersonal, interpersonal, organizational, political by targeting children, teachers, parents, school, and policy) to prevent obesity.\textsuperscript{13,83} From a health promotion perspective, schools represent a contained and accessible setting for interventions to promote well-being.\textsuperscript{46,117} Finally, schools are an optimal setting for health promotion because the government can mandate what occurs in schools whereas their influence over the home setting is limited. For example, policies set out by the SEP can impact the school environment (e.g., school rules, and dictate teacher and student behaviour. Therefore, schools represent a logical site for interventions aimed at preventing childhood obesity.

2.10.1 Evaluating the effectiveness of school based interventions for childhood obesity prevention

The aim of the following section is to review and discuss the effectiveness of individual, environmental, policy, and multicomponent school based interventions for obesity prevention in school age children, with reference to evidence from school based interventions carried out in
Mexico where possible. This review will be comprehensive, but not exhaustive given space constraints.

The issue of intervention effectiveness in the prevention of obesity in children has been discussed and debated from clinical, epidemiological, and health promotion perspectives. Most obesity interventions attempt to impact, directly or indirectly, one or more biological outcomes such as body mass index (BMI), adiposity, or fitness. Therefore, the scientific expectation is that an effective school based intervention is one that leads to improvements in one or more of these biological outcomes. This is true of a majority of interventions, whether they involve nutritional or physical activity components, or a combination of both approaches. Given that a multicomponent intervention has a wider scope and targets more than one risk factor, the expectation for a biological impact tends to be even higher in this type of design.

From a clinical/epidemiological perspective an intervention is not considered effective or meaningful unless it has a biological impact and the non-biological outcomes of the intervention (such as changes in food intake and physical activity) are considered less relevant and/or insufficient. The problem with this view is that this standard derives from efficacy trials where the conditions of the intervention are tightly controlled. One cannot expect the same efficacy in environmental school based interventions, which take place in real-world settings where tightly controlled conditions are nearly impossible.

In health promotion research and practice, the biological impact is not the only priority or measure of success for a program given that the emphasis is not necessarily on the individual, but rather, on obesity risk factors. Health promotion researchers consider positive changes in the food environment, dietary intake, physical activity levels, and other behaviours (sedentary behaviour, TV watching, intake of sweet beverages) to be measures of success for obesity prevention, because these factors are all expected to have a positive effect over time on weight status and/or other health risks. Therefore, positive changes in environment and behaviour are considered evidence of success by some health promotion scholars and practitioners.
The majority of school based obesity prevention intervention programs have been mostly unsuccessful in improving biological outcomes. The ongoing debate about whether or not investments in school based obesity prevention programs are warranted has left a gap in the research about what type of school based interventions are most effective and sustainable for preventing obesity in children. This debate has led scholars and scientific task force committees to conclude that there is “insufficient evidence” to determine how to effectively intervene in school settings to prevent obesity. School based interventions have been unsuccessful partly because there are several difficulties to develop, implement, and evaluate multicomponent obesity-prevention interventions as well as methodological shortcomings. These methodological shortcomings and the school based interventions will be critically discussed in the following section.

2.10.2 Environmental school based interventions

Environmental school based interventions are those designed to change the physical environment, policies, or practices within the school to provide opportunities for children to be active and eat healthy food. These types of intervention constitute an integral part of using an SEM. A key advantage of environmental interventions is that practices and policy changes could potentially be incorporated and sustained on a wider population level. These interventions tend to incorporate one or both of the nutrition and physical activity (PA) domains. The sections that follow provide a review of the most common environmental nutrition and PA school based interventions to prevent obesity.

2.10.2.1 Environmental nutrition interventions

Environmental nutrition interventions aim to improve the food environment at school by changing school food policy and/or enhancing the availability of healthy food in schools. Environmental nutritional interventions in schools typically focus on improving the content of nationally distributed food (e.g., breakfast and lunch programs), school vending machine
offerings, school canteen fare, and other sources of at school meals (including independent food vendors).

Intervening in school food environments has gained considerable attention in the health promotion arena during the last several years. The sale of food in schools has been subject to controversy and debate stemming from the competing interests of profit-driven food corporations and health promoting nutritional advocates. Many schools allow outsourcing of food sales at school to independent vendors, either by promoting foods in vending machines or selling non-healthy items in alternative lunch programs (a la carte) because it improves the economic stability of the school, even though the food might not necessarily meet nutritional and health standards. According to a recent school report from the USA and a consumer report from Mexico, many schools and school districts have allowed corporations to promote the consumption of sweetened beverages and foods of little or no nutritional value in schools. Oftentimes, these companies offer incentives to schools in the form of educational materials, sports equipment, or monetary prizes. Resource-strapped schools are not in a position to refuse such offerings and corporations may benefit from a philanthropic aura when they provide such sponsorship. The substantial commercial interests behind the sale of food in school makes it difficult to regulate the food environment; as a result, the most readily available foods at schools tend to have low nutritional value.

Overall, environmental nutrition interventions are characterized by the provision of fruits and vegetables, improvements in beverage consumption (i.e., reduction in soda intake), modification of school meals, changes in nutrition policy (nutrition guidelines) and the modification of environmental cues (vending machines, water fountains). According to systematic reviews and meta-analyses, these interventions have had no effects on BMI in children, on overweight, nor on obesity prevalence at schools and thus are considered ineffective from a clinical standpoint.
There are two possible explanations for the lack of documented impact of school based obesity prevention intervention programs on BMI. First, the environmental nutrition interventions aim to influence energy imbalance of the children indirectly by first improving factors such as food availability and children’s dietary habits. These types of changes take time, so the potential impacts of the intervention on BMI may occur beyond the scope of the study period, if at all. Second, evaluations of these interventions may simply not measure or report BMI as a primary outcome measure. Instead, limited study resources may restrict the focus to improving and measuring intermediate outcomes such as food intake and availability of fresh fruits and vegetables. For instance, National interventions in Norway and the USA that promoted fruits and vegetable consumption in schools measured changes in fruit and vegetable intake, and changes in willingness to try new fruits. Research about environmental nutrition interventions tends to report these types of behavioural outcome measures, rather than BMI and biological factors. Environmental nutrition interventions with an education component have been significant mainly in improving dietary practices, although some have also been successful in reducing BMI over short- and long-term periods.

Overall, this literature review shows that there is only limited evidence demonstrating a reduction of overweight and obese in children through the implementation of long-term nutritional environmental and policy interventions in schools. Only a few environmental interventions – mainly those supported by education strategies – have had an impact on BMI.

From a health promotion perspective, however, many of these interventions are considered to be successful, for they have improved the availability of healthy food (i.e., fruits and vegetables, water, non-sugary beverages, healthy snacks) in the school environment, positively impacted students’ dietary choices, improved the intake of healthy food by students at school, and reduced obesity risk factors.
So, even though public health practitioners advocate for environmental nutrition interventions, there is only a narrow evidence base from which to evaluate the effectiveness of these interventions on obesity prevention. Moreover, existing barriers such as logistical constraints, competing commercial interests, and a lack of comprehensive nutritional policies at schools (i.e., absence of school nutritional guidelines) represent a challenge to the implementation and evaluation of school-based nutrition interventions. Until more evidence is available, the promise of such interventions should not be discarded, but instead be augmented with stronger strategies to influence environmental and policy level constructs and stronger research designs to gauge their impact.

2.10.2.2 Environmental Physical Activity Interventions

In a review of the association of school environments with youth PA, Sallis and colleagues found that schools with a richer activity environment, including basketball hoops and soccer goals, combined with adult supervision or equipment, had significantly more students who chose to be active after lunch or after school. Physical Education (PE) at school can also contribute to the overall PA of children and adolescents because most children spend one third of their weekdays at school. Moreover, school is where the behavioural foundation for PA (i.e., motor skills, cognitive and social development) often begins through formal PE classes and informal play at recess. In schools in urbanized and insecure places such as Mexico City, school may be the only safe place where some children may engage in PA. Therefore, engagement in PE and PA in schools is important to make children move and to assure energy balance.

Environmental physical activity interventions aim to change the physical environment, policies, or practices within the school to provide more physical activity opportunities. The physical activity environment in schools is influenced by national PE curriculum (number of hours per week), use of active recess periods, and the level of physical activity achieved by students at school. Researchers argue that the effectiveness of a PA intervention is measured by
whether or not the intervention changed the school physical activity environment, which ideally will be associated with decreased BMI and/or adiposity in children.\textsuperscript{116, 149}

There are many different interventions that address PA at school, and they take place across different school settings (i.e., classroom, school events, active recess, after school programs etc). A common PA intervention that has shown mixed effects on BMI and fitness involves the modification of physical education (PE) classes at school. According to some school based intervention studies carried out in US and Canada, improving the quality and quantity of PE classes does not affect BMI, but has been associated with improvement in other measurements, such as minutes of MVPA.\textsuperscript{68, 115, 155, 156, 157, 158} On the other hand, other studies have demonstrated a significant improvement in BMI and fitness following short-term PA interventions.\textsuperscript{149, 159-161} There are several reasons for the conflicting findings regarding the impact of environmental PA interventions, such as insufficient prescribed dose of PA, environmental barriers to effective implementation, lack of compulsory PA,\textsuperscript{121} and budgetary cuts to school systems.\textsuperscript{144} The PA interventions that have demonstrated BMI impact in children have adopted a comprehensive environmental approach in school, which includes PE improvement along with PA instruction during school breaks, increased availability of PE and PA equipment, and the provision of mass communication and media information about PA.\textsuperscript{115, 129}

Several systematic reviews and meta-analyses reveal that the impact of school based interventions varies according to the type of intervention, the duration and frequency of the PA intervention, and the gender of the children. For instance, Harries et al\textsuperscript{162} showed in their meta-analysis that school-based PA interventions had minimal effects on BMI change.\textsuperscript{162} Contrary to this finding, a recent literature review and a meta-analysis\textsuperscript{161} reported a statistically significant reduction in BMI in the short-term when PA was the only intervention focus rather than when PA interventions were part of program including additional behaviour change interventions.\textsuperscript{151}

In sum, the evidence about the effectiveness of environmental PA interventions is scattered, heterogeneous and inconclusive, and thus does not provide a clear guideline for
interventions. The interventions examined to date appear to be less effective in boys than girls and further work is required to explore the reasons.\textsuperscript{161, 163, 115, 120} The PE interventions that impacted BMI in children include offering a higher number of PE classes (i.e., four times per week),\textsuperscript{164} more time devoted to MVPA during PE classes,\textsuperscript{164, 115, 156} and PE delivery by specialized PE teachers.\textsuperscript{115, 144, 157} It is unlikely that school based PA interventions alone offer a solution for preventing obesity in school settings, however, given the evidence,\textsuperscript{68, 115, 155, 156, 157, 158} it is likely that school based PA interventions should be included in a comprehensive school based obesity prevention program.

\textbf{2.10.2.3 Multicomponent intervention programs}

School-based intervention programs to address childhood obesity prevention have the potential to combine environmental and behavioural interventions and thus can be amplified by combining components designed to foster “behaviour-environmental” synergy.\textsuperscript{116, 117} A growing body of evidence suggests that intervention programs should integrate several intervention strategies at a time and several simultaneous objectives in different domains.\textsuperscript{11, 48, 119} Typically, a multicomponent school based obesity prevention intervention program is consistent with the principles laid out by the SEM. It aims to improve food and PA choices in a comprehensive way by targeting several levels of behavioural influence simultaneously (i.e., schools, parents, and children, policy). A large body of evidence recommends multicomponent interventions as feasible and effective for enhancing environmental conditions in schools and promoting behavioural change in students.\textsuperscript{11, 35, 47, 67, 116, 117, 128, 165} These intervention programs include changes in food services (food availability) and food environment, educational activities to support the environmental changes, integration of nutrition and PA in the school curriculum, promotion of PA at school, improvement of PE classes, improvement of nutrition policy, and parental involvement, among others.\textsuperscript{11, 35, 116, 120, 166, 152, 167, 144} However, the ideal characteristics and combination of interventions to achieve program success are not straightforward. There are uncertainties related to ideal program duration, frequency, and intensity, and recommended
“doses” of intervention for each of the different ecological levels of influence (e.g., students, parents, teachers, physical environment, policy).\textsuperscript{118}

For instance, a multicomponent intervention that has been used as a model is the Child and Adolescent Trial for Cardiovascular Health (CATCH), which targeted ethnically diverse children in 96 schools in the USA for three academic years. The intervention program included comprehensive nutrition and PA strategies in addition to modification to school food services, enhanced PE, and improved classroom health curricula. Results showed that BMI did not differ significantly in the intervention group as compared with control group at the third year of intervention.\textsuperscript{168} According to the researchers, several barriers might have impeded the achievement and maintenance of children's healthy behaviours, including the summer break, the lack of a family component, and the lack of control of other outside school variables, such as exposure to media, and availability of grocery stores, parks, and recreation facilities. Similar results were observed in the Pathways study,\textsuperscript{127} which was implemented in elementary schools in Native American communities in the US. The intervention program included changes in dietary intake, PA at schools, a classroom curriculum and family-involvement activities.\textsuperscript{127} The results showed no significant difference in weight, BMI, or percentage body fat between intervention and control groups.\textsuperscript{169} In Europe, other multilevel interventions to prevent obesity among school children showed similar results. The Active Program Promoting Lifestyles Education in School (APPLES) implemented in primary schools in the UK had multiple PA and nutrition related components.\textsuperscript{147} Researchers found no change in BMI, although vegetable consumption was found to be higher in the intervention group.\textsuperscript{170}

Even those multicomponent interventions that included an explicit behaviour change component had a low impact in promoting PA and nutrition changes at school. For instance, the German Kiel Obesity Prevention Study (KOPS)\textsuperscript{171} implemented an intervention program that included developing knowledge, self-monitoring, increasing self-esteem, and building personal autonomy among children. Short-term effects included increased nutrition knowledge, increased
daily PA, and decreased TV watching. Medium term effects showed that body composition didn’t change among intervention children, although percentage of body fat did increase among children in the control group. In Australia, the Switch Play project, based on SCT and SEM, was implemented in elementary schools targeting children 10 years of age for one academic year. Students were randomized by class to one of the four conditions: a behavioural modification group (BM), a motor skills group (FMS), a combined BM and FMS group (BM/FMS), and a control group (C). Results showed lower TV watching in the BM group at 6 months and children in the BM/FMS group were less likely than controls to be overweight/obese between baseline and post-intervention assessments.

In sum, the review of multicomponent interventions shows no patterns at all regarding the optimal combination of interventions and length of successful interventions for obesity prevention in schools. The majority of the interventions ranged from one to fourteen academic years long. There is inconclusive evidence regarding what types of interventions were more effective and whether or not there is an ideal combination of strategies. In most cases, the multicomponent school interventions aimed to influence obesity risk factors such as behavioural and environmental outcomes, and thus did not anticipate a direct and immediate effect on biological outcomes such as BMI.

The review of findings of multicomponent school based meta-analyses are also mixed. One meta-analyses concluded that school-based interventions were effective in reducing the prevalence of childhood obesity in the short term. In contrast, other meta-analyses concluded that there is not enough statistical evidence available to demonstrate that a combination of interventions is any more effective in reducing obesity in the long term than single or individual interventions.

Overall, the effectiveness of combined diet and PA interventions to prevent obesity is unclear. The success of interventions varied by sex, age, and length of intervention.
research is needed to determine the optimal combination of components to impact the school environment, children’s behaviour, and biological outcomes such as BMI.

2.10.3 Evaluation of the SEM multicomponent interventions

A multilevel, multicomponent intervention that follows the SEM involves targeting multiple levels of influence, even though there are no integrated theories to simultaneously influence intrapersonal, interpersonal, organizational, community, and policy outcomes approaches.\textsuperscript{114} Given the nature of this approach, it is difficult to identify the specific impact of the various components of the intervention.\textsuperscript{115} In terms of effectiveness, there is currently no consensus regarding what constitutes the most effective number and combination of strategies to achieve permanent behavioural change.\textsuperscript{68, 86, 176-179} Moreover, there is a lack of evaluative frameworks and theoretical models to determine under which conditions multilevel interventions are preferable and which interventions will be the most effective.\textsuperscript{67, 93, 120, 125} Therefore, it is very complex and difficult to implement and evaluate multicomponent interventions. Moreover, some researchers argue that there is a lack of specificity of the hypothesized influences of multicomponent interventions because there is a lack of information about behavioural mediators and interactions across levels.\textsuperscript{47, 93, 179} Consequently, several authors have argued that there is insufficient evidence on how best to intervene (i.e., achieve an optimal ecological integration) and on how to evaluate a multicomponent SEM-based intervention.\textsuperscript{51, 177, 180} The theoretical and evaluation challenges of the SEM have led to research gaps regarding the effectiveness of obesity prevention interventions in children.\textsuperscript{47} According to some researchers, evidence for the effectiveness of intervening in the school setting is contradictory and sometimes considered weak,\textsuperscript{11, 47, 120, 124} especially for developing countries.\textsuperscript{125, 181}

In sum, after intensive work within schools for obesity prevention, the impact of SEM multicomponent is mixed and generalizable solutions remain elusive. Recent evidence has shown that there is accumulating evidence that school-based interventions can significantly reduce children’s BMI.\textsuperscript{161} An extensive US report that analyzed 124 programs that aimed to prevent
weight gain and reduce obesity risks in children concluded that the best programs are school based, include interventions to improve nutrition and PA, and involve parents.\textsuperscript{182} However, the key effective characteristics of such programs have yet to be fully established, and since most studies have been conducted in the USA, it remains unknown whether or not they are effective elsewhere.\textsuperscript{182}

\textbf{2.10.4 SEM-based school interventions for obesity prevention in Mexico}

The increased prevalence of OWO in children, and the obesogenic environment in Mexican schools substantiate the need for SEM-based intervention programs to prevent obesity. However, published evaluations of SEM-based intervention programs at schools in Mexico are very limited. A comprehensive search of the English and Spanish peer-reviewed literature on childhood OWO in Mexico revealed cross-sectional studies describing the etiology\textsuperscript{75, 183-186} and magnitude of the problem\textsuperscript{187}; predictors of obesity, and chronic disease risk factors\textsuperscript{188-190} (such as high blood pressure,\textsuperscript{185, 189} adiposity\textsuperscript{75} and metabolic syndrome\textsuperscript{29}); and maternal perceptions of OWO in preschool children.\textsuperscript{186}

Published results were available for only two school-based programs in Mexico\textsuperscript{191, 192} that delivered an intervention to prevent childhood obesity, neither of which were based on a SEM approach. One intervention program used different strategies such as improvement of the national breakfast program, promotion of fruits and vegetables, PA routines at recess, and educational materials (videos and booklets) to prevent BMI increase in school children.\textsuperscript{191} The intervention evaluation did not assess environmental outcomes, failed to find behavioural or biological impacts, and there was no indication that the effort was ecologically-driven nor generalizable to other schools in Mexico. The other RCT’s intervention program aimed to reduce cardiovascular risk in school age children through the delivery of two PA routines, and found aerobic exercise to be an effective strategy to reduce some cardiovascular disease risk markers.\textsuperscript{192} Finally, a review of reviews\textsuperscript{51, 120, 121, 181, 193, 194} found no mention of any school-based interventions in Mexico, and
only some studies that targeted Mexican school age children in the USA. Therefore, we can conclude that in Mexico, SEM school-based interventions to prevent obesity among school age children are scarce.

**Summary**

There is a lack of evidence on how to intervene and how to promote behavioural and environmental change to prevent obesity within a school setting, especially in middle income countries, such as Mexico. The purpose of this thesis is to report on the effectiveness of a SEM based obesity prevention intervention program implemented within the context of an RCT and to comprehensively document school environmental and policy actions carried out in the Mexican school system as a first attempt to identify promising strategies for intervening in Mexican schools.

**2.11 School System in Mexico**

The Mexican School System is run by the Secretaria de Educacion Publica (Secretary of Public Education -SEP) that is a federal government authority with cabinet representation and responsibility for overseeing the development and implementation of national educational policy and school standards in México. The children enrolled in the public Mexican school system attend school for only 4.5 hours a day, either during a morning or afternoon shift for 40 weeks (school cycle length) of the year. Schools have no cafeteria facilities and few schools have a canteen. Food availability in schools mostly depends on private food vendors (typically a community member who prepares food in their kitchen at home) who are selected by school authorities, based on hygienic standards, to sell foods to students during recess. The intent is to provide students with snack options rather than a full meal, given that children have breakfast and lunch at home and many are beneficiaries of the Federal School Breakfast Program. With regards to PA opportunities at school, until very recently only one 50-minute weekly PE class was scheduled in the majority of the public elementary schools in Mexico City. Moreover, the actual
occurrence of these PE classes can vary given the high cancellation rate observed in schools, due to other priorities or PEP shortcomings such as lack of human resources (PE teachers), materials, and appropriate areas for delivering PE classes.69

This thesis contains four manuscripts that collectively contribute to the school-based behavioural change and obesity prevention literature. The first manuscript describes in detail the methods and rationale of a school-based randomized controlled trial (RCT) carried out in Mexico City in 2006-2008 by the INSP in response to the obesogenic environment prevailing in the schools of Mexico City. The aim of this manuscript is to document the design and methods of a complex two-year multifactorial, multilevel RCT conducted in 27 elementary schools in Mexico City to evaluate the effectiveness of an environmental intervention program.

The second manuscript presents the environmental, behavioural, and biological impact of the two-year school-based intervention program carried out in Mexico City. The aim of this manuscript was to assess the effectiveness of the school-based intervention program in order to provide evidence to foster policy change in Mexican elementary public schools.

The third manuscript describes the integration of ecological principles and SCT theoretical constructs of the two year school-based obesity prevention program in Mexico City. The aim of this manuscript was to map out the integration of ecological principles and theoretical constructs used in the school-based intervention program in order to understand critical intervention components and to help health practitioners in emerging countries design efficient and effective ecological school-based interventions to prevent obesity.

The fourth manuscript assesses the policy quality and implementation of a new national school regulation that guides food and PA practices in Mexican schools. The aim of this paper was to assess the quality of the School Guidelines and implementation of the policy during its second year of implementation according to a policy analysis framework by Hogwood and Gunn,195 and the World Health Organization (WHO) School Policy Framework.117
REFERENCES


52. Schwartz MB, Brownell KD. Actions Necessary to Prevent Childhood Obesity: Creating the Climate for Change. The Journal of law, medicine & ethics: a journal of the American Society of Law, Medicine & Ethics. 2007; 35:78-.


108. Baranowski T, Cullen KC, Nicklas T, Thompson D, Baranowski J. Are Current Health
Behavioral Change Models Helpful in Guiding Prevention of Weight Gain Efforts? Obesity
Research. 2003; 11.

Physical Activity and Health. 2006; 3.

110. Walton M, Waiti J, Signal L, Thomson G. Identifying Barriers to Promoting Healthy Nutrition in

111. Story M, Nanney MS, Schwartz MB. Schools and Obesity Prevention: Creating School
Environments and Policies to Promote Healthy Eating and Physical Activity. Milbank Quarterly.
2009; 87:71-100.

112. Katzmarzyk PT, Baur LA, Blair SN, Lambert EV, Oppert JM, Riddoch C. International
Conference on Physical Activity and Obesity in Children: Summary Statement and


Viswanath K, editors. Health Behavior and Health Education: Theory, Research, and Practice.

115. Naylor PJ, McKay HA. Prevention in the First Place: Schools A Setting for Action on Physical


CHAPTER 3: MANUSCRIPT 1

Promoting a Healthful Diet and Physical Activity in the Mexican School System for the Prevention of Obesity in Children: Rationale, Design and Methods

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Acknowledgments

The authors are grateful to all the researchers and health promotion practitioners from the INSP who implemented the study.
Abstract

Overweight and obesity in Mexican children is increasing at an alarming pace in school-aged children. **Objective:** This paper describes the rationale, design, and methods of a two-year randomized controlled trial conducted to evaluate the effectiveness of an INSP environmental intervention in 27 elementary schools in Mexico City. **Methods:** There were two units of analysis, school level addressing changes in elementary public part-time schools, and individual-level addressing behavioural changes in students 9 to 11 years of age. Two intensities of an intervention program were implemented (basic and plus), each containing two intervention components: physical activity, nutrition, supported by communication/education component. Evaluation of the intervention was carried out during the school cycles 2006-2007 and 2007-2008. **Results:** Primary outcomes were overweight and obesity prevalence and fitness; environmental and behavioural measures were also examined. **Conclusions:** This is the first school-based multilevel, multifactorial project, consistent with the best practices available in current literature, carried out in Mexico to prevent childhood obesity in schools.

**Key words:** obesity prevention, nutrition, physical activity, school-based intervention and evaluation, childhood obesity in Mexico, obesity in school-aged children.
BACKGROUND AND RATIONALE

The rate of overweight and obesity in Mexican children is growing at an alarming pace. According to findings from the 2006 National Nutrition Survey (NNS), and based on the International Obesity Task Force (IOTF) classifications, from 1999 to 2006 the rate of overweight and obesity in school-aged children (5-11 years of age) went from 18.4% to 26.2% or 34.8% (according to the WHO growth reference), representing an increase of 42.4% in 7 years.

The incidence of overweight and obesity in school-aged children is most disquieting in Mexico City, where obesity prevalence, according to the BMI IOTF, was the highest of all regions both in 1999 (24.6%) and in 2006 (33.3%).

The most recent nutrition survey ENSANUT showed that the prevalence of overweight and obesity in school age children in 2012 was 34.4% which if its contrasted with the 2006 prevalence results in a slight decrease (from 34.8 to 34.4%).

The negative implications associated with the obesity epidemic facing countries around the world are extensive, particularly when the condition is observed at an early age. At an individual level, childhood overweight carries a myriad of short and long-term health risks by increasing the likelihood of type 2 diabetes, renal diseases, metabolic syndrome, hypertension and hyperlipidemia, as well as depression. Collectively, overweight and obesity carry sizeable economic implications for health systems and societies.

The school is an important system and serves as a connection of children to the social infrastructure. Schools represent a contained context where children spend one third of their day; they are an ideal setting in which to intervene on child well-being. School-based health promotion interventions are recommended for children due to the feasibility of combining environmental and behavioural strategies within a common setting. Prevention of childhood obesity founded on a socio ecological model (SEM) that addresses environmental conditions prevailing at schools in addition to behavioural targets, has become a common practice around the world. A recent review provides convincing evidence that school-based interventions are effective for preventing obesity risks factors by
enhancing healthy eating and physical activity at school.\textsuperscript{15} Extensive research shows successful interventions with positive behavioural outcomes such as improved dietary practices\textsuperscript{16-19} and physical activity (PA) practices during recess and PE classes\textsuperscript{20, 21} in schools of developed countries. However, the effectiveness of SEM based multicomponent, multilevel, school-based interventions that address both dietary and PA behaviours in developing countries is limited and inconsistent.\textsuperscript{22-24}

According to research carried out by our team, the public school environment in Mexico can be considered to be “obesogenic” (obesity promoting), not only because of restricted opportunities for physical activity,\textsuperscript{25} but also because of increased opportunities to consume energy-dense foods and snacks including sugar-sweetened beverages (SSB).\textsuperscript{26-28} The dramatic rise in the prevalence of overweight and obesity in Mexican children and the obesogenic environment that prevails in Mexican schools provide a solid rationale to develop effective strategies to address this serious public health problem. The National Institute of Public Health in Mexico (INSP) designed and implemented an innovative environmental intervention to promote healthy lifestyles to address obesity in school-aged children from 16 elementary schools in Mexico City. This paper describes the design and methods of a two-year randomized controlled trial that was conducted to evaluate the effectiveness of the INSP environmental/behavioural intervention to prevent childhood obesity. An overarching research goal was to provide evidence to foster policy change in Mexican elementary public schools.

**RESEARCH GOAL**

The research goal was to obtain evidence to be used for fostering policy change aimed at achieving an environment that promotes healthy dietary practices and physical activity of children in Mexican School System.

**RESEARCH AIM**

The aim of this research was to obtain evidence about the effectiveness of a 2 year school-based intervention program to reduce the prevalence of overweight and obesity, improve body composition, and
improve fitness scores by changing the school environment and by enhancing dietary practices and physical activity in 4th-6th grade children in Mexican elementary public schools.

STUDY DESIGN

A Randomized Control Trial (RCT) was conducted in 27 schools in Mexico city; interventions were randomly allocated to either the basic condition (n=8), the plus condition (n=8), or to the control condition (n=11). The evaluation of the intervention program effectiveness used an experimental design and was carried out during the school cycles 2006-2007 and 2007-2008. The RCT consisted of one baseline and three follow-up assessments. The follow-up assessments were carried out at the end of the school cycle in 2007, at the beginning of the school cycle in 2008 and at the end of the 2008 school year. A monitoring information system was used throughout the intervention period to assure minimal compliance of the schools with the strategies. The monitoring information system focused on the collection of food availability and physical activity process indicators.

School inclusion criteria: Due to logistic constraints and funding availability, we limited the research to elementary schools in the South of Mexico City. The selection of schools was thus constrained to those located in four “delegaciones” (administrative zones that comprise Mexico City): Xochimilco, Magadalena Contreras, Coyoacan and Tlalpan, and meeting the following inclusion criteria: a) being a public school of Mexico City; b) having a part-time schedule (children attending from 8:00 am to 12:30 pm); c) belonging to the socioeconomic status (SES) classified by the Secretaria de Educación Publica (Secretary of Public Education, SEP) as low SES (C category in Mexico city); d) having at least 300 students enrolled at the elementary level (3 or more groups per grade); e) having an availability of school sports materials (provided by the MOE); f) having similar size areas to perform PA; and g) participating in the Federal School Breakfast Program.
STUDY SAMPLING

Sampling Frame: There were two units of analysis in this study: elementary public part-time\(^1\) schools (primary sampling unit) and students 9 to 11 years of age within schools (secondary sampling unit). Some of the environmental effects were evaluated at the school level, while the behavioural effects and the long-term outcome variables were evaluated at the individual (child) level. Individual level effects were evaluated in 4\(^{th}\) and 5\(^{th}\) grade public school students, who were followed over two years through to their completion of the 5\(^{th}\) and 6\(^{th}\) grades respectively. Children ages 9 to 11 years of age were chosen as the secondary sampling unit because during this stage of child development and maturation, intermittent physical activity (highly common in younger ages) decreases, and more structured patterns of physical activity are seen.\(^{29}\) This age is also more convenient for measurement and better captures whether or not children have the habit of practicing physical activity.\(^{29}\) Moreover, children in the 9 to 11 year age range are able to understand and reliably answer closed-ended questionnaires because they are generally becoming more competent in thinking abstractly and in grasping more complex concepts.\(^{30, 31}\)

Sample size calculation: Since there was no epidemiological, behavioural and contextual information regarding public elementary school children in Mexico City when we designed the study, we used the information available from the previous phase of this study (formative research) to calculate the sample size. This calculation was done in accordance with the obesity prevalence observed in the formative evaluation phase carried out in 2005-2006 in 12 schools of Mexico City by the INSP research team.\(^{32}\) Assuming a 40% prevalence of overweight and obesity in the project schools, a 10% relative difference in BMI prevalence between children from intervention and those from control schools would be considered to be a clinically meaningful difference.\(^{33}\) The sample size required to detect a 10% difference between groups was calculated to attain a power of 0.8 and a type I error (alpha) <0.05 (two-tailed), using an intra-class correlation coefficient (ICC) of 0.08.\(^{33}\) This calculation yielded a minimum sample size of 8 schools, in each of the two intervention groups (described below) and 8 schools in the

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\(^1\) Schools with a part-time schedule of 8 a.m. to 1 p.m. are more common in Mexico City. At the time of the study, a small proportion of elementary schools in Mexico City provided lunch and afternoon activities and could be considered full-time. These schools were not included in this study.
control group, with 240 children per group for anthropometric measurements. The number of children selected to assess opportunities to engage in moderate to vigorous physical activity (MVPA) in physical education (PE) classes and recess, and the number of children selected for the evaluation of food intake were based on the largest possible number given logistic and financial restrictions of observation methodologies.

**School selection:** A preliminary list of 1,283 schools in Mexico City was provided by the Administración Federal de Servicios Educativos (Federal Administration of Educational Services in the Federal District of Mexico –AFSEDF). We identified 274 schools located in the four “delegaciones” of interest (Xochimilco, Tlalpan, Magdalena Contreras, and Coyoacan). Of these, only 84 partially met the inclusion criteria, and 40 agreed to participate in the study. Finally, from these 40, we randomly selected 27 schools, oversampling the control group by 3 schools in anticipation of attrition.

**Student recruitment:** All of the children from 4th to 5th grades in the 27 schools were invited to participate in the evaluation. Approximately 2,430 consent forms and information letters were sent to parents. Overall, 1712 students obtained parental consent. Student assent was also sought on data collection day. No data were collected without both parental and student consent. Out of 1712 eligible students, we randomly selected 886 children at baseline and followed them during the second year. In order to compensate for attrition of 56 students from year 1 to year 2, an additional 93 students were recruited in the second year. Student selection was stratified by school grade and performed with a computer-generated random numbers list assuming an equal proportion of girls and boys and an equal proportion of children from every 4th and 5th grade classroom per school. Figure 3.1 show the project consort diagram.
STUDY OUTCOMES

To evaluate the effectiveness of the INSP environmental/behavioural intervention in 27 elementary schools in Mexico City we identified the following outcomes:

**Intermediate outcomes:** a) the availability of healthy foods and beverages (including water) during recess time; b) opportunities to eat at school; c) opportunities to engage in PA at school; d) intake of food and beverages at school; e) opportunities to be active during PE class and recess time; and, f) quantification of physical activity during PE and recess time.

**Long-term outcomes:** a) prevalence of overweight and obesity; b) body composition; c) average fitness scores of students based on cardio-respiratory fitness, muscular endurance, and flexibility.

A detailed description of measures is provided in a subsequent section. Figure 3.2 presents the intervention outcomes/evaluation logic model as per Goodstadt (2005) health promotion logic models.  

**Ethics approval and informed consent letters:** The Research, Ethics and Biosecurity Committee of the INSP reviewed and approved the study protocol. All parents of selected children provided informed consent that allowed their children to participate in the study and the selected children were asked to provide assent.
Figure 3.2: Logic Framework of Promoting a Healthful Diet and Physical Activity in the Mexican School System for the Prevention of Obesity in Children: Rationale, Design and Methods

**Implementation of strategies**

**NUTRITION Interventions + Supportive Communication/Education Component**
- Increased availability of F & V and water supply
- Decreased availability of high energy dense products
- Increased knowledge and awareness related to healthy eating and PA
- Increased opportunities to be physically active at school
- Adequate PE classes
- Promotion of organized activities during recess

**OUTCOMES**
- Increased availability of F, V and water at schools’ retailing points
- Increased consumption of healthy food at school
- Improved self efficacy, attitudes, skills and knowledge related to healthy eating and PA
- Increased physical activity during PE class and recess

**INTERMEDIATE OUTCOMES**
- Increased the proportion of children with normal % of body fat
- Increased the proportion of children with healthy diets
- Increased the proportion of children who meet the recommendations of daily MVPA
- Improved children’s fitness

**ENVIRONMENTAL Inventories**
- F&SSB available or purchased
- PA areas and fitness equipment
- Opportunities to eat and be active

**SOFIT:**
- Quality and quantity of PE classes

**BEHAVIORAL**
- Observation
  - Feeding & PA practices
- Pedometers
  - Number of steps during school day

**LONG-TERM OUTCOMES**
- Anthropometry
  - Height
  - Weight
  - Skin folds
- Fitness:
  - Strength
  - Flexibility
  - Endurance

**Evaluation of the program**

Pre and post evaluations in environment in 27 schools and school age children
Prior to the intervention, in 2005, the INSP carried out a formative evaluation in 12 schools in Mexico City in order to assess the school environment and to identify potential interventions. For this purpose, AFSEDF and the Dirección General de Educación Física del DF (Physical Education General Direction of DF -DGEDF) of the Secretaría de Educación Publica (Secretary of Public Education, SEP) of Mexico City partnered with the INSP to facilitate access to the elementary school system. Once the INSP diagnosed the environment of the schools in Mexico City as obesogenic, the INSP and the Federal SEP/AFSEDF/DGEDF authorities participated in a consultative process led by the INSP where a group of experts and authorities identified potential interventions to be implemented in the schools. Furthermore, the consultative process was also carried out at the school level where teachers and school authorities such as principals and area supervisors identified the most feasible potential interventions. Once the project began in 2006, the INSP and the SEP/AFSEDF/DGEDF formed a working committee to ensure continuity of the partnership and to create an intervention delivery plan. In concordance with this plan, the working committee advocated for school ‘authorities’ and school ‘communities’ participation in the intervention in order to strengthen the collaboration and to identify ways to enhance the commitment of key actors (school supervisors, principals, teachers, PE teachers, food vendors, parents, and children) at the school level. Thus, the SEP authorities supported the INSP project by their active involvement in the project, by increasing awareness among other sections of the SEP through meetings and memos distributed among authorities about childhood obesity and the need to create a healthy school environment. In addition, they sponsored workshops for PE teachers designed to improve the quality of the PE classes. Overall, SEP/AFSEDF/DGEDF actively participated in all meetings organized by the INSP team and collaborated in decision-making about the best ways in which interventions could be delivered.
INTERVENTION DESIGN

**Intervention Description:** The intervention was designed according to the formative research findings from the previous phase, literature review of effective strategies, a consultative process with the international experts, SEP authorities and schools stakeholders, and a supportive communication/education component based on Social Cognitive Theory (SCT) and Theory of Planned Behaviour (TPB) and Health Belief Model (HBM). Figure 3.3 shows the phases involved in the formative research and the development of the intervention strategies.

The intervention duration was seven months during the first year and eight months during the second year. Two main intervention components focusing on nutrition and PA were developed based on formative research findings 12, and the socio-ecological model. The intervention strategies sought to establish an environment at school that would give children the opportunity to increase PA and to reduce intake of energy-dense food and sugar-sweetened beverages.

Two distinct intervention programs were implemented: a basic intervention that was considered feasible to implement at low cost (referred to hereafter as “basic intervention”) and a more intensive intervention that would require greater investments (referred to hereafter as the “plus intervention”).

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2 The consultative process was carried out at the INSP in Cuernavaca with SEP stakeholders, INSP researchers and United Kingdom experts. (Tim Lobstein PhD, James Reilly PhD, Ricardo Uauy PhD, Juliana Kain PhD, Annie Anderson PhD and Karen Lock PhD).
The components of the basic and plus nutrition and PA intervention components as well as, the supportive education/communication component are described in the following section and summarized in Table 3.1. The model of the theory-based intervention is described in Appendix A.

Basic Intervention: Using existing school infrastructure and resources to ensure sustainability with no additional investment, the basic intervention mainly consisted of the implementation and monitoring of norms or regulations consistent with healthy lifestyles. This implementation was based on the willingness and participation of school community actors (teachers, principals, and authorities of the SEP, AFSEDF, DEGEDF). This set of interventions was established according to feasibility criteria in short-term implementation, and budget constraints. This was in order to make possible a short-term replication...
without the need of additional resources. It included the two main intervention components: nutrition, PA, and one supportive communication/education component.

**Nutrition intervention, basic, year one:**

a) Promotion to increase the availability of healthier food choices and to reduce the availability of energy-dense products (balancing the products sold at the canteen): since there were no institutional guidelines or policies to control food intake inside the schools when we implemented the project (and at that time there were no Mexican nutritional guidelines to promote healthy eating in schools), we had to identify a mechanism to promote healthy intake at schools without violating the autonomy of the school cooperative. Therefore, in order to ensure the children’s access to healthy food items at school, authorities were asked to balance the availability of products sold in the school canteen by reducing non-healthy food options such as sweets, chips, candies and SSB (including sodas, artificial juices and industrialized beverages) while increasing healthier choices such as fruit, vegetables and low- and non-sugared fruit beverages.

In order to reduce energy-dense products in schools and given the lack of nutritional guidelines at schools, the research team created a **Recommendations list of recommended, recommended for consumption no more than twice a week, and non-recommended food products** based on the sugar and fat content and the potential nutritional value of each item\(^50\). This list was designed by the INSP team based on the quantity of energy and fat content of each food items that was obtained from national nutrition tables, food industry nutrition labels, or calculated from the recipes obtained from each school vendor. A preliminarily list containing potential products was discussed with school authorities and, upon agreement of all participating schools, a comprehensive list of healthy food items with low fat and sugar content was created and the food items were made available for purchase in participating schools. All basic intervention schools were required to comply with the list.
**Recommended products** are items considered healthy based on their energy content and overall nutritional value such as boiled corn with lemon, “no fried and low-fat tacos” (made of mushroom, cactus, potatoes), vegetables with lemon (cucumber, carrots), fruits (mango, “jícama”, melon, pineapple, watermelon), sorbets, low sugar agua de frutas.

**Recommended for consumption no more than twice a week products** are defined as products that have some nutritional value, but given the way they are prepared or the portion size sold, contribute excessive calories or other undesirable elements to a child’s diet. All of the foods included in this list could be modified to become healthier options. This includes popcorn with butter, salted peanuts, salted corn, rice with milk and sugar (“arroz con leche”), non-fried high-fat “tacos” (meat, potatoes with sausage, poblano pepper with cream), ham sandwiches, water-based jellos, and boiled corn with mayonnaise.

**Non-recommended** products are food items with high caloric density and/or high in sugar and fats. Given their preparation, these foods cannot be modified into healthier options. These include home-made deep-fried foods (“tacos”, “gorditas”), pizzas, French fries, fried and breaded meat sandwiches (“tortas de milanesa”), hot dogs, caloric carbonated beverages, doughnuts, ice cream, milk-based jellos, cookies, and sweet snacks (cupcakes, cakes and sweet bread).

b) **Promotion to modify culinary techniques and ingredients of products sold during recess.** The **Recommendations List** also addressed culinary practices and provided suggestions of alternative ingredients to aid food vendors in improving the nutritional value of food sold at school. The aim behind this recommendation was to reduce fat and sugar content in the home-made food items sold by the school food vendors. Food vendors were instructed to replace deep-fried or fried culinary techniques in home-made food preparation by grilling/baking homemade foods. In addition, we promoted the elimination or substitution of fat or sugar laden ingredients by other ingredients (e.g., using lime juice on fruit instead of whipped cream).

c) **Limiting of food exposure and reducing eating opportunities** Given that children had more than five opportunities to eat during the school day, the intervention promoted a reduction in food
exposure and the number of opportunities to eat at school by engaging school staff. The research team encouraged classroom teachers to comply with the policy of not eating during lesson time, (except during the federally sponsored school breakfast), and promoted recess as the only period during which eating would be permitted.

d) Ensuring water availability Given that drinking water was not available at most schools, the intervention ensured water availability by providing schools with approximately ten 19L water containers per month during the intervention period.

**Nutrition intervention, basic, year two:**

During year two, strategies were targeted at 5th and 6th graders (previously 4th and 5th). The same components as year one were implemented, but with a stringent prohibition against eating during lesson times and a limit of school breakfast time to 20 minutes; this strategy was implemented to limit the opportunities to eat freely anytime during class (even if they were items from the Federal Breakfast Program). Improvements were also made to the *Recommendation list*, so as to further restrict the availability of energy dense products: we banned sugar-sweetened beverages and re-labelled the foods that were previously classified as “food recommended less than twice a week” to non-recommended foods.

**Physical Activity (PA) intervention, basic, year one:**

In order to increase opportunities to perform PA during the school day and to enhance the quality of the physical education (PE) program, three strategies were used: PA promotion during recess, more active time during PE, and improvements to the PA environment. These strategies are described below.

a) Promotion of PA during recess and free time. This strategy consisted in using an activity box that contained printed cards that suggested activities with structured games to promote organized PA at recess and free time, designed for and tested on elementary school-aged children. The Activity Box
contains more than 150 cards, each with a different activity to take place during recess time, assuming the necessary space and basic material are available. The Activity Box was revised and adapted before distributing it to the intervention schools to guarantee that all the activities described could take place in the space available in the public elementary schools of Mexico City. When delivering each Activity Box, we also included basic material for the implementation of the activities listed in the box (ropes, elastic bands, etc.). All of the activities described in the box are "play oriented", meaning they are not highly competitive in nature and do not require specific sports-related abilities from the children participating in them. They are also basic enough that they don't need to be directed by a PE teacher. The most complex activities contained in the box are similar to games such as "4-corners". The activity box was used to engage 4th and 5th graders in structured PA. Teachers were trained as the primary users and organizers of these activities every day at recess for 15 minutes.

b) Improving the quality Physical Education (PE) at least 50 minutes per week. In order to increase the quality of PE lessons, we encouraged the PE teachers to use PE time wisely and ensure that at least half of the class (25 minutes) was devoted to MVPA by suggesting strategies on how to maximize the PE time and avoid kids sitting or waiting around their turn to participate in activities.

c) Improving the school premises and providing sports equipment. The INSP improved the PA school premises to facilitate PA engagement by assisting PE teachers to promote the use of PA areas by painting games and sport courts (soccer, volleyball and basketball) on the ground. In addition, each school received PA equipment such as basketballs, soccer balls, jumping ropes, basketball nets, and elastic bands in order to support the PE classes and games and activities contained in the activity box.

Physical activity intervention, basic, year two:

The PA during free time became more structured and mandatory. PE teachers were trained by the PEGD in simple PA and kinesiology routines and provided 15 to 20 minutes of “activation” to the school community (including teachers and students) four days a week (from Tuesday to Friday) in the morning before the beginning of classes. Moreover, at the beginning of the second year, PE teachers were
sensitized by the INSP on the importance of healthy lifestyles and how to promote healthy lifestyles in the school.

**Communication/Education supportive component, basic, year one and two:**

The purpose of this component was to support the environmental and behavioural interventions by increasing school community awareness and self-efficacy (SE) for improving healthy habits by promoting positive attitudes towards healthy lifestyles in order to complement the nutrition and PA intervention/activities. Thus, a massive communication campaign based on formative research, SCT\textsuperscript{45} and Social Marketing approach\textsuperscript{51, 53} was developed (including name, slogan, image and concept) and was pilot tested prior to its implementation.\textsuperscript{45, 54} Through the use of posters with comic characters, five healthy behaviours were promoted: a) increasing fruit consumption, b) increasing vegetable consumption, c) promoting water consumption, d) increasing physical activity, and e) bringing a healthy lunch to school. The aim of this campaign was to increase knowledge and improve attitudes of the above-mentioned behaviours by proving super-powers to the fruits, vegetables, water, tennis shoe and lunch box.

In the first year, handouts were designed to increase knowledge and improve attitudes, based on SCT, and field-tested for the following stakeholders: 1) parents (how to pack a healthy lunch); 2) school vendors (alternative and improved culinary practices); and 3) PE teachers (tips on how to improve the quality and quantity of the PE classes). Training and motivation sessions were also developed based on TPB,\textsuperscript{46} and SCT, and HBM\textsuperscript{47} and were field-tested for use in 4\textsuperscript{th} and 5\textsuperscript{th} grade students, school vendors and teachers.

For instance the food vendors’ were recipients of a workshop, during which the main objectives were to: 1) evaluate their own eating behaviour, weight and risk of chronic disease; 2) describe the list of recommendations for the sale of food in the schools; 3) discuss what could be done to improve food offerings in schools in which they worked; 4) commit to changing his/her own products in order to comply with the INSP recommendation list. This first workshop was mostly motivational and based on the
HBM\textsuperscript{26,28,55} components (perceived susceptibility, severity of illness and benefits of improving the food availability/intake) and SCT\textsuperscript{45} SE constructs. Thus vendors themselves were weighed, had their BMI calculated, their blood pressure taken and their diet evaluated through a 24h recall and discussion of the effects of unhealthy eating and the benefits of changing the negative behaviour.

In the second year, some components were implemented the same way as in year 1 (i.e, pamphlets and booklets), but in general, the strategies were thoroughly revised. The comic characters were made the central icons for all planned communication/education activities, parents received four newsletters throughout the year, and, to improve communication between the INSP and the schools, a bulletin board was set up in each of the schools. These bulletin boards mainly described activities planned and also included a mailbox where feedback on project implementation could be submitted. Compared to year one, these measures required some additional investment of resources.

During this second year we delivered a set of workshops based on SCT and TPB targeted to children of 5\textsuperscript{th} and 6\textsuperscript{th} grades with the aim to improve attitudes and beliefs about healthy eating. We also delivered a workshop to vendors in which we aimed to improve their SE to change food availability and provided the how-to information for them to be able to implement the improved recommendation list. An example of one of the workshop activities was to have the vendors write down the recipes for the products they sold in schools and then try to modify it so that it would comply with the recommendation list.

**Plus Intervention:** In addition to the implementation of regulations described for the main components of the basic intervention, the plus intervention included activities that required additional financial investment and human resources. It was presumed that this additional investment would yield enhanced effects as compared to the basic intervention. Specific components of the plus intervention are described below.
**Nutrition intervention, plus, year one:**

In addition to the strategies used in the basic intervention and described previously, two additional strategies to improve food availability at schools were as follows:

a) **Promotion of a designated day to sell only fruit and vegetables in school.** The aim of a designated day to sell only fruits and vegetables was to promote the intake of these healthy foods, and to demonstrate that children will accept and eat fruit and vegetables if they are available. Authorities determined the F&V Day and food vendors sold fresh fruits and vegetables and/or vegetable-based homemade foods (such as baked vegetable quesadilla) on that day.

b) **Limiting the sale of energy-dense food products to one or two days a week.** The sale of energy-dense food items such as sweets snack, chips, candies and sugar beverages products were limited to one or two days a week.

**Nutrition Intervention, plus, year two:**

In the second intervention year, we carried out the same intervention as year one and also banned the daily sale of energy-dense products and improved the food *Recommendation List* by re-labelling the food items into two categories – recommended and non-recommended food items.

**Physical Activity intervention, plus, year one:**

The strategies in the plus intervention included the same PA strategies described under the basic component with some additional improvements to the PE classes, and PA “activation”. These additional strategies were:

a) **Improving the quality PE at least 100 minutes per week.** In order to increase the minutes of MVPA in PE, the DEGEDF at the central level and the INSP hired 8 external PE teachers to assure additional PE classes for children of 4th and 5th grades. Therefore, these students had 100 minutes of PE per week and at least 50 minutes of MVPA. In order to increase the quality of the PE class, workshops for PE teachers on improving the effectiveness of the PE classes were designed and tested.
b) Mandatory Physical Activation: 15-20 minutes of PA engagement four times a week. External physical educators hired by the DEGEDF provided a mandatory 15 to 20 minutes of activation to all the children in the plus schools during morning commencements, assuring 15 to 20 minute of PA a day. These physical educators also directed the active recess in those schools, using the Activity Box.

**Physical activity intervention, plus, year two:**

In year two, the double session PE class continued with children of 5th and 6th grades, and the activation and improvement of the premises at the schools were also implemented, but the Activity Box implementation at recess was cancelled when the SEP notified the INSP that internal regulations actually forbid the use of recess for something other than resting. The active recess continued during year two, consisting only of having a specific area on the patio for those students choosing to partake in PA during recess time.

**Communication/education supportive component, plus, years one and two:**

The activities included in the communication component in plus schools included the massive communication campaign developed to promote the five behaviours already described in basic schools. Furthermore, in addition to the handouts distributed to children, vendors, and PE teachers, children participated in two SCT and TPB workshops, and vendors, parents and PE teachers in one SCT workshop during the year.

In year two, in addition to the massive communication campaign and school bulletin boards, 5th and 6th grade children participated in two new healthy eating SCT and TPB workshops and two comic strip drawing contests, and parents received four SCT newsletters.

An additional sensitizing workshop on healthy lifestyles based on SCT and HBM was implemented for staff and school authorities, including PE and regular teachers. We invited teachers to take a leading role in their health and join us for half day to hear talks about healthy lifestyles, do some
PA and eat healthy. Thus, teachers and principals participated in a welcome brunch at the INSP premises where they learned about the overweight and obesity epidemic in Mexico and about the strategies we were implementing to address the problem in their schools. In addition, school authorities were taught about the importance of healthy lifestyles and obesity prevention. We measured the blood pressure, glucose levels and weight and height of the teachers and principals to provide them with a personalized health profile.

**Validation of communication/education supportive materials**

To validate the communication component, we carried out interviews with children in order to test the concepts, messages, images and slogans according to the Social Marketing approach.\(^\text{56}\) Once we had tested these messages, we validated the communication campaign with focus groups carried out with target age children from schools similar to our intervention schools. Through these focus groups, the concept, characters, slogans and messages were thoroughly tested for comprehension and interpretation.\(^\text{56}\) It was an iterative process in which, the creative team and the researchers would revise the materials after every field test and test them again.

A readability test using a modified-for-Spanish Flesch Kinkaid formula was conducted to test the printed materials with teachers, vendors and parents. In addition, the brochures were validated with each target audience through individual interviews and a questionnaire that included questions measuring general comprehension, message recall, language appropriateness, perceived usefulness of the information presented, and image and graphic appropriateness.\(^\text{57}\).

Finally, to evaluate the communication component, we designed one instrument that aimed to measure knowledge about the characters, recall of the messages and characters, overall liking of the posters and finally, whether the target audience had tried to follow any of the messages in the posters.
Table 3.1: Nutrition, Physical Activity Intervention and Communication/Education supportive component

<table>
<thead>
<tr>
<th>Nutrition Intervention</th>
<th>Basic</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Plus</th>
<th>Year 1</th>
<th>Year 2</th>
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<tbody>
<tr>
<td>Promoting to increase the availability of healthier food choices (balancing the products sold at the canteen)</td>
<td>Continued in year two</td>
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<td>Promoting to increase the availability of healthier food choices (balancing the products sold at the canteen)</td>
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<td>Prohibiting of eating during lesson time and limit “school breakfast” time to 20 minutes</td>
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<td>Prohibiting of eating during lesson time and limit “school breakfast” time to 20 minutes</td>
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<td>Reducing exposure to eating opportunities</td>
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<td>Reducing exposure to eating opportunities</td>
<td>Continued in year two</td>
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<td>Ensuring water availability</td>
<td>Continued in year two</td>
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<td>Ensuring water availability</td>
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<td>Limiting availability of sugared beverages in the school</td>
<td>Continued in year two</td>
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<td>Limiting availability of sugared beverages in the school</td>
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<td>Limiting of the sale of certain densely energetic foods</td>
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<td>Limiting of the sale of certain densely energetic foods</td>
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<td>Promoting to reduce the availability of candy and sweets</td>
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<td>Promoting to reduce the availability of candy and sweets</td>
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<td>Limiting the sale of certain densely energetic foods</td>
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<td>Limiting the sale of certain densely energetic foods</td>
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<td>Promoting to modify culinary techniques and ingredients of products sold during recess</td>
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<td>Promoting to modify culinary techniques and ingredients of products sold during recess</td>
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<td></td>
<td>Promoting of a fruit and vegetable day</td>
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<td>Discontinued for year two</td>
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### Physical Activity Intervention

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<th>Basic</th>
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<th>Year 2</th>
<th>Plus</th>
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<tr>
<td>Promoting active recess: using an Activity Box</td>
<td>Discontinued in year two</td>
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<td>Promoting active recess: using an Activity Box</td>
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<td>Organizing PA during recess and free time</td>
<td>Continued in year two</td>
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<tr>
<td>Improving the school premises and provide sports equipment</td>
<td>Continued in year two</td>
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<td></td>
<td>Improving the school premises and provide sports equipment</td>
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<tr>
<td>Improving the quality of PE: one lesson 50 minutes/week</td>
<td>Continued in year two</td>
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<td>Improving the quality of PE and MVPA time: two lessons 100 minutes/week</td>
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<td>Activation: 15-20 minutes of activation to all children from Tuesday to Friday</td>
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<td>Communication/ Education Component</td>
<td>Basic</td>
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<tr>
<td>Mass Communication campaign targeted to children to promote four basic behaviours through messages and concepts: fruit and vegetable consumption, engage in PA and pack a healthy lunch</td>
<td>Continued in year two</td>
<td>Mass Communication campaign targeted to children to promote four basic behaviours through messages and concepts: fruit and vegetable consumption, water consumption, engage in PA and pack a healthy lunch</td>
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<td>Supportive resources were provided such as pamphlets to <strong>PE instructors</strong>: to improve the quality of PE classes</td>
<td>Continued in year two</td>
<td>Supportive resources were provided such as pamphlets to <strong>PE instructors</strong>: to improve the quality of PE classes</td>
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<td>Supportive resources were provided such as pamphlets to <strong>parents</strong>: how to prepare a healthy lunch</td>
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<td>Supportive resources were provided such as pamphlets to <strong>vendors</strong>: how to improve culinary techniques and sell healthy food</td>
<td>Newsletter for parents and bulletin boards at schools promoting healthy eating and being active</td>
<td>Supportive resources were provided such as pamphlets to <strong>vendors</strong>: how to improve culinary techniques and sell healthy food</td>
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<td>Communication/ Education Component!</td>
<td>Supportive resources were provided such as workshops: <strong>food vendors</strong> how to improve culinary techniques and sell healthy food</td>
<td>Supportive resources were provided such as workshops: <strong>food vendors</strong> how to improve culinary techniques and sell healthy food</td>
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<td>Supportive resources were provided such as workshops: <strong>PE instructors</strong>: how to improve the quality of the PE class</td>
<td>Supportive resources were provided such as workshops: <strong>PE instructors</strong>: how to improve the quality of the PE class</td>
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<td>Educational and skill based workshop with students aimed to achieve energy balance at school, promote fruit and vegetable intake and teach how to pack healthy lunch</td>
<td>Educational and skill based workshop with students aimed to achieve energy balance at school, promote fruit and vegetable intake and teach how to pack healthy lunch</td>
<td>Continued in year two</td>
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<td>Supportive resources were provided such as workshops: <strong>school authorities</strong> sensitizing on healthy lifestyle and the benefits of healthy eating and PA</td>
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Implementation process:

The implementation of strategies and communication/education component was encouraged during meetings with involved actors, including SEP authorities at the federal, central, and local levels. At the school level, INSP staff met with parent associations and teachers to explain the importance of program implementation and to increase awareness and promote children's participation through parental consent. In addition, a workshop was carried out in each of the schools to present the program's target behaviours and to recruit parents in the team effort. In this case, the workshops were mainly focused on motivating, providing knowledge and improving attitudes to support the nutrition and PA interventions and to join in the effort. We also asked the teachers for activity ideas for influencing children's behaviour above and beyond the planned interventions.

A team of 12 implementers (3 per school) was hired and trained by the program coordinators and was assigned to visit each school two or three times a week in order to support the implementation process and to solve unexpected problems. Implementers participated in monthly technical council meetings to discuss project details and to answer questions from teachers and school principals. In order to ensure proper implementation, a monitoring information system specifying minimal standards for compliance (percentage of strategies implemented/week) by strategy/school was developed for each set of strategies. Process indicators were collected three to four times a week in each intervention school and consisted of a simplified checklist capturing whether or not the intervention was being implemented as intended. Implementation integrity was quantified by a percentage of adherence to planned activities.

EVALUATION METHODOLOGIES

We assessed the school environment and PA and dietary behaviours of children using quantitative and qualitative methodologies piloted during a formative evaluation conducted in Mexican schools.55, 58, 59

Personnel training and instrument standardization: All outcome measures were assessed using methodologies and tools adapted for school-aged children (9-11 years old) from Mexico City. Trained nutrition, social work, nursing, and physical education field workers implemented data collection tools.
Re-standardization took place periodically throughout data collection phases according to established protocols.\textsuperscript{59}

**School environment measures:** In addition to the specific measures described in this section, the total number of opportunities for eating and being active were recorded at each school during each data collection phase.

1. **Availability of healthy foods and beverages and opportunities to eat healthy food at school**

   1.1 Availability of healthy and non-healthy foods and beverages: An inventory of food items was completed at each school by nutritionists who observed food offerings, weighed all foods available for sale, and/or surveyed independent food vendors allowed on school grounds. Foods were classified into one of the following three categories: Recommended foods; Foods recommended for consumption no more than two times a week; and Non-recommended foods. A log of purchased foods was also made. Inventories were completed two to three times per week during each data collection phase.

   1.2 Availability of water: The total number of water containers (19L) available in 4\textsuperscript{th} to 6\textsuperscript{th} grade classrooms and elsewhere in the school was recorded.

   1.3 Opportunities to eat: The total number of opportunities to eat at school was observed using a checklist specifically designed for this study; this included the consumption inside classroom especially before and after recess. In addition, in plus schools, we observed whether or not children had a time limit (20 minutes) or were restricted to eating only during the school breakfast program.

2. **Availability of resources and opportunities to be physically active at school**

   2.1 Availability of PA areas and PE Equipment: Trained field workers counted the total number of outdoor and indoor areas (e.g., patios, gyms, auditoriums, painted courts) used for PA and PE classes. An inventory of school-owned sport and PA equipment available was also taken at each school during each data collection phase.

   2.2 Quality of physical education classes: Trained observers assessed the quality of PE
lessons by recording students’ levels of physical activity using SOFIT (System for Observing Fitness Instruction Time). SOFIT allows the observer to quantify the activity level of students during the PE classes in minutes. It also provides information on class context and PE teacher behaviour. SOFIT has been shown to be reliable and valid. The detailed methodology of the SOFIT data collection and analysis of this research project have been described elsewhere.

3. Child behavioural (healthy eating, PA) and psychosocial measures:

Observation and survey methods were used to assess food and beverage intake; food purchases at school; child PA at school and at home; and, psychosocial measures are described in this section.

1.1 Food and beverage intake and purchases at school: A direct observation protocol complemented by a close-ended survey was used to assess child food and beverage intake and purchasing patterns in a subsample of children. Due to feasibility and budgetary constraints we randomly selected eight children per school (4 per grade) for observation of their dietary patterns during recess time. Before the eating break, during class time, selected study participants were asked to show their lunch boxes to a nutritionist and to describe their composition. The nutritionist recorded the content and portions of food and beverage items contained in the homemade lunches and the amount of money the child brought from home to spend on food at school. Then, during the recess, these same participants were unobtrusively observed by the nutritionist who recorded what they had consumed. Each nutritionist recorded all the foods and beverages and the serving sizes of food items purchased and consumed at recess, according to the portions specified in the Mexican equivalent system.

1.2 Physical activity at school: The NL-1000 pedometer (NEW-LIFESTYLES, Lee’s Summit, MO) was used to assess the total number of steps taken during five consecutive days (i.e., from Monday morning upon arrival at school until Friday afternoon at school dismissal). The internal clock on all pedometers was set to restart every day at 08:00 hours, the hour the school day began. This programming set the step count to be zero at the beginning of each school day, thereby allowing us to isolate the steps taken during the school day. The steps in memory corresponded to the 24-hour period from 08:00 of the first day to
07:59 of the next day. We verified the calibration of all pedometers before each data collection phase. The detailed methodology is described elsewhere.\textsuperscript{56}

1.3 Psychosocial measures and self-reported behaviours: A 35-minute questionnaire based on the Theory of Planned Behaviour\textsuperscript{1} was used to collect relevant knowledge, attitudes, social norms, perceived behavioural control (i.e., self efficacy), and behavioural intent related only to the evaluation of the communication/education component.

4. Child biological (anthropometric and fitness) measures:
Prevalence of overweight and obesity were assessed by measuring individual height and weight (to calculate BMI). Anthropometry, physical fitness and sociodemographic measures (i.e., child date of birth, gender, grade, and group assignment) were also recorded.

1. Anthropometric measures
Height (standing height in cm) was measured with a Dynatop stadiometer having a capacity of 2 meters and accurate to 1mm. Weight (in kg) was measured with a portable electronic scale (Tanita). BMI was calculated according IOTF cut off points.\textsuperscript{61} Skin fold thickness (triceps and sub scapular) were measured with a Harpenden Caliper. Arm and calf circumference were measured with a K-E anthropometric tape. We followed the Anthropometry Procedures Manual for the National Health and Nutrition Examination Survey (NHANES) 2000 for children over 8 years old.\textsuperscript{58} The anthropometry team was standardized according to Habitch methodology.\textsuperscript{62} This method has been employed previously in in Mexico.\textsuperscript{63} To avoid confounders of body composition change due to sexual maturation, we measured maturity through non-invasive and non-costly methods, such as self-report of the menarche status of girls.

2. Physical fitness measures
Fitness measures assessed endurance, flexibility, and strength using three types of tests:

2.1 A 9-minute distance run: the total number of meters that a child could run during 9 minutes.
2.2 Sit-and-reach: the total number of times that a child could reach his/her hands beyond his/her feet while sitting on the ground with extended legs and ankles spread apart shoulder-width.

2.3 Sit-ups and push-ups: the total number of sit-ups completed in a 60 second time period and the maximum number of push-ups a child could complete without stopping.

The detailed fitness methodology of this research project is described elsewhere. A score for overall fitness was then calculated using an algorithm that integrates each of these measures.

Table 3.2 presents the operationalized environmental, behavioural, and biological measures.
Table 3.2 Operationalized environmental, behavioural, and biological measures.

<table>
<thead>
<tr>
<th>Type of Impact</th>
<th>Assessment</th>
<th>Data Sources</th>
<th>Variables</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCHOOL ENVIRONMENT</td>
<td>Availability of healthy food and/or beverages at schools' cooperatives and concession stands</td>
<td>1) Food and beverage inventories at schools</td>
<td>Number of portions of recommended food items available</td>
<td>% of recommended food items at school</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of portions of food for consumption no more than 2/week availability</td>
<td>% of potentially healthy food items at school</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of portions of non recommended food items available</td>
<td>% of non-recommended food items at school</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>% Energy per-capita</td>
<td>% Fat per-capita</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2) Water container inventories at school</td>
<td>Number of water containers at school/weekly</td>
<td>% of water containers at schools</td>
</tr>
<tr>
<td>Quality and Quantity of physical activity instruction at school</td>
<td>Observation of PE classes and recess using SOFIT:</td>
<td>Observation of PE classes and recess using SOFIT:</td>
<td>Length of PE class in Minutes</td>
<td>% of class time dedicated to Physical Activity</td>
</tr>
<tr>
<td></td>
<td>1) Intensity of the class: (Sedentary or MVPA)</td>
<td>1) Intensity of the class: (Sedentary or MVPA)</td>
<td>Type of activities done in PE class: instruction, motivation, administrative</td>
<td>% of children participating in PE class</td>
</tr>
<tr>
<td></td>
<td>2) Lesson context: General content, general knowledge, physical activity knowledge, fitness, skill practice, game play, and free play</td>
<td>2) Lesson context: General content, general knowledge, physical activity knowledge, fitness, skill practice, game play, and free play</td>
<td>Minutes of MVPA by context in PE class</td>
<td>% of time spent in moderate to vigorous physical activity during PE class</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minutes of MVPA in PE class</td>
<td>% of time spent in sedentary activity during PE class</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minutes of sedentary activity in PE class</td>
<td>% of time and minutes of MVPA at recess</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Minutes of MPA in recess</td>
<td>% of time and minutes of sedentary activity at recess</td>
</tr>
<tr>
<td>Opportunities to eat at school</td>
<td>Observation of food intake in classrooms</td>
<td>Number of children freely eating in the classroom</td>
<td>% of children who eat inside the classroom</td>
<td>% of children who eat inside the classroom</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of professors promoting the intake inside the classroom</td>
<td>Number of opportunities to eat in the school day</td>
<td>Number of opportunities to eat in the school day</td>
</tr>
<tr>
<td>BEHAVIOURAL IN CHILDREN</td>
<td>Purchasing/consumption of food and beverages during recess</td>
<td>Observation of children food items purchased and consumed at recess</td>
<td>% of recommended items purchased/consumed</td>
<td>% of recommended for consumption twice a week items purchased/consumed</td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------------------------------------</td>
<td>-------------------------------------------------------------</td>
<td>---------------------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Quantity of steps taken at school</td>
<td>Steps counts in PE classes and recess (using pedometer)</td>
<td>Number of steps at school (PE class and recess)</td>
<td>Number of steps outside school</td>
<td>Number of steps (counts) per-post</td>
</tr>
<tr>
<td>Psychological (Self reported)</td>
<td>Questionnaire on five healthy behaviours</td>
<td>Children’s general knowledge, attitudes, social norms, perceived behavioural control (i.e., self efficacy), and behavioural intent related to 5 behaviours promoted</td>
<td>Change in psychological indicators pa and post in regards promoted behaviours</td>
<td></td>
</tr>
<tr>
<td>BIOTHERMAL IN CHILDREN</td>
<td>Body Composition</td>
<td>Anthropometric measurements</td>
<td>Weight (kg)</td>
<td>Height (m)</td>
</tr>
<tr>
<td>Fitness</td>
<td>1) 9-minute distance run</td>
<td>Strength</td>
<td>2) Sit-and-reach</td>
<td>Flexibility</td>
</tr>
</tbody>
</table>
Monitoring Information

Process indicators were collected weekly during the implementation in the intervention schools; the percentage of compliance to planned nutrition, PA and communication strategies was assessed. During year one, 75% of the nutrition intervention was implemented while 70% of the PA intervention was implemented overall (mainly due to cancellation of PE classes). Ninety percent of the communication/education intervention was implemented. During year two, 80%, 70% and 95% of the nutrition, PA and communication/education intervention were implemented as planned across the 16 intervention schools.

Characteristics of baseline schools and children

The intervention duration was seven months during the first year and eight months during the second year. On average, the schools had between 316-755 students, between 11-20 teachers and 1-2 physical education teachers, with no difference between intervention groups. Table 3.3 shows the baseline characteristics of children included in the evaluation of the intervention. On average, children were almost 10 years old, and had a BMI of 19.8. The combined prevalence of overweight and obesity was 43.5%, with no difference between groups.
Table 3.3 Descriptive characteristics of measured children by intervention group at baseline of year one (2006-07).

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
<th>Intervention Group</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( N ) &amp; Mean(^2) &amp; SD(^1) &amp; ( N ) &amp; Mean(_n) &amp; SD &amp; ( N ) &amp; Mean &amp; SD &amp; ( N ) &amp; Mean &amp; SD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (y)</td>
<td>860</td>
<td>9.7</td>
<td>0.7</td>
<td>252</td>
<td>9.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>860</td>
<td>38.6</td>
<td>9.8</td>
<td>252</td>
<td>37.5</td>
<td>9.8</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>860</td>
<td>138.8</td>
<td>7.1</td>
<td>252</td>
<td>137.9</td>
<td>7.1</td>
</tr>
<tr>
<td>BMI</td>
<td>860</td>
<td>19.8</td>
<td>3.7</td>
<td>252</td>
<td>19.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Weight status(^3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adequate</td>
<td>486</td>
<td>56.5</td>
<td></td>
<td>156</td>
<td>61.9</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>257</td>
<td>29.9</td>
<td></td>
<td>62</td>
<td>24.6</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>117</td>
<td>13.6</td>
<td></td>
<td>34</td>
<td>13.5</td>
<td></td>
</tr>
</tbody>
</table>

\(^{1}\) Standard deviation or as specified
\(^{2}\) Mean or percentage comparison adjusted for study design. No difference among groups (p>0.05)
\(^{3}\) According to IOTF

STUDY LIMITATIONS

To implement the project we had to overcome obesogenic factors rooted in the Mexican School System such as lack of nutritional guidelines regarding the sale of food products in schools, limited awareness and knowledge about healthy lifestyles among key actors (SEP authorities, school supervisors, school directors, teachers and food vendors), and lack of comprehensive regulations to adequately guide healthy eating and physical activity in schools.

Even though the majority of key actors collaborated with the project during year one, we documented through a parallel qualitative research process, some resistance to collaboration that compromised the implementation. At the school level, we observed a general lack of motivation to take on additional tasks and a general apathy towards the childhood obesity problem. The resistance issues observed were related to lack of resources (human and financial), lack of time by those charged with implementing intervention, and a lack of incentives for school staff; this was especially true for the PE teachers trying to implement
the PA intervention. Other resistance issues that impaired the implementation were the teachers’ lack of knowledge about healthy lifestyle practices. In addition, competing curricular commitments, issues related to responsibility, and interpretation of SEP’s internal regulations also affected the implementation. For example, a lack of clarity concerning issues of jurisdiction resulted in uncertainty about whether or not active recess could be implemented or whether food items at school canteen could be modified. At the federal level, even though we had been able to establish partnerships and raise awareness about the obesity issue, a lack of resources (e.g., not enough budget to hire more PE teachers or to provide sports materials) limited their ability to enforce policies and regulations. Another important limitation was the lack of continuity between school intervention activities and family practices; teachers’ motivation to change the school environment was hampered by parents’ reluctance to modify family practices. Since this was a real-world effectiveness research trial, strategies were not always implemented as planned as conditions differed across the schools. For instance, in some schools over 30% of the scheduled PE classes were cancelled during the intervention period either because they didn’t have PE teacher or they had other priorities. The prioritization of other activities over PE has been reported elsewhere and remains a constant challenge for schools in the Mexican school system. Finally, during year two we lost a plus school due to changes in the school curriculum policy; therefore, this school became a full time school and no longer met the study inclusion criteria of being a half time school. This change was beyond our control. Overall, many of the limitations observed were not unique to our project and have been encountered by others attempting to change the school food and PA environment.

To overcome the above mentioned limitations, we modified the original project plan and implemented and evaluated a communication/education component to support the nutrition and PA intervention, increase awareness, promote participation, and reduce resistance. We believe that the implementation of this component helped us reduce the political, organizational, and personnel resistant constrains at school.

CONCLUSIONS
Extensive research reveals that the school environment plays an important role in sustaining the energy imbalance that leads to overweight and obesity in school children.\textsuperscript{64, 65} Consequently we implemented two intervention strategies over two school cycles: Nutrition, Physical Activity, and one supportive Communication/Education component. Together, these strategies will give us the opportunity to address the problem comprehensively and to learn how much can really be accomplished relative to the number and type of resources invested. To our knowledge, this is the first institutional multilevel, multifactorial project carried out in Mexico to prevent childhood obesity in schools. Consistent with the best practices available in current literature,\textsuperscript{64, 66} the project addresses both physical activity and diet, with the benefit of partnerships among different entities.\textsuperscript{22, 24} The evaluation will address different levels of factors to assure that even intermediate effects can be detected. If these strategies prove to be successful and can be properly regulated and institutionalized, assuring full implementation, the outcomes could be of significant magnitude in the prevention of childhood obesity through the promotion of healthy environments at schools. Furthermore, the documentation of the design and rationale, implementation, and evaluation of an obesity prevention strategy has a great value in emerging countries where few experiences have been documented.

Our aim was produce evidence about effective programming to promote energy balance through healthy lifestyles and to impact public policies to prevent childhood obesity at the school level; however, we recognize that multipronged approaches including education, PA and family involvement are necessary for optimal effectiveness and that establishing guidelines to govern the types of foods that can be sold in and around schools can improve student health.

One policy strategy that has been derived from this research, among others, is the Mexican National Guidelines for Healthy Eating in Schools, which regulate food availability and portion sizes in schools as well as promoting the intake of water and the improvement of PE classes.
REFERENCES


2. de Onis M, Bloßner M, Borghi E. Global Prevalence and Trends of Overweight and Obesity 

3. Rivera JA, Irizarry L, González-Cossio T. Overview of the Nutritional Status of the Mexican 
Population in the Last 2 Decades: Results from the Three National Nutrition Surveys. Salud Publica de 
Mexico. 2009; 51:S645-S56.


5. Gutiérrez JP, Rivera-Dommarco J, Shamah-Levy T, Villalpando-Hernández S, Franco A, Cuevas-
Instituto Nacional de Salud Pública 2012.

6. Olshansky SJ, Passaro DJ, RC. H. A Potential Decline in Life Expectancy in the United States in 

Obesity Reviews. 2004; 5.

8. Franks P, Hanson RL, Knowler W, Sievers M, Bennett PH, Looker HC. Childhood Obesity, Other 

9. Daniels SR. The Consequences of Childhood Overweight and Obesity Source: The Future of 
Children. Childhood Obesity Spring [serial on the Internet]. 2006; 16(1): Available from: 

2007; 357.


60. Perez-Lizaur AB, Palacios B, AL. C. Sistema Mexicano de Alimentos Equivalentes. Fomento de Nutricion y Salud AC, Ogali. Meixco


66. Institute of Medicine, Youth CoPoOiCa, editors. Preventing Childhood Obesity: Health In The Balance Washington D.C: National Academy Press; 2003.
CHAPTER 4: MANUSCRIPT 2

Impact of a school-based intervention program on obesity risk factors in Mexican children

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Acknowledgements

The authors are grateful to all the researchers and health promotion practitioners from the INSP who implemented the intervention strategies and collected the data. The authors would like to thank Eric Monterrubio and Héctor Lamadrid-Figueroa for their assistance in the data analysis advice.
Abstract

Objective. To evaluate the impact of an 18-month school obesity prevention intervention on the health behaviours of 4th and 5th grade students based on ecological principles and formative research conducted in Mexico. Methods. A RCT design was used to assign 27 schools to one of three conditions: basic or plus interventions and control. School environment measures, children’s eating and physical activity behaviours, and body mass index were assessed 4 times over a 2-year period in a sample of 830 students. Results. In the intervention schools, the availability of healthy foods increased with a concomitant decrease in unhealthy food availability. Food intake showed the same trend. In the intervention schools, children did not engage in more moderate to vigorous physical activity (MVPA) in physical education (PE) class or recess but increased steps taken. Obesity prevalence did not change. Conclusion. The intervention improved the school food environment and child health behaviours.

Key words: obesity prevention, nutrition, physical activity, school-based intervention, ecological intervention, obesity in school-aged children.
INTRODUCTION

Schools are ideal settings for delivering health promotion services and strategies because they provide access to a large number of children in a contained environment.\(^1\) Schools can contribute to obesity prevention by offering an optimal environment and opportunities for healthy behaviours.\(^2,3\)

The global childhood obesity epidemic has created a situation wherein the current generation of children may live shorter and less healthy lives than their parents.\(^4,5\) In Mexico, the prevalence of overweight and obesity in children increased from 18.4% in 1999, to 26.2% in 2006, to 30.3% in 2008.\(^6-8\) Because Mexican children spend approximately 22 hours per week in school for 10 months of the year, the school environment has likely contributed to the increase in these conditions, which is consistent with evidence showing that the environment of elementary schools in Mexico promotes energy-dense food and sugar sweetened beverage (SBB) intake and restricts opportunities for physical activity (PA).\(^9-13\)

The World Health Organization (WHO) recommends multifactor, multilevel intervention approaches to prevent obesity in the population, including school-aged children. Such interventions should include strategies to enhance both healthy eating and PA and should be based on theories and models that consider psychosocial and environmental influences on behaviour.\(^2,3\)

Since obesity is the result of sustained positive energy balance, which is the consequence of higher energy intake relative to energy expenditure in multiple settings and environments where children live, it is not surprising that few interventions reported in the literature have been successful at impacting BMI in participating children.\(^13-19\) This is likely because many of these interventions were exclusively implemented in the school environment, where children spend only part of their time, and did not influence energy intake and expenditure in other settings. Moreover, BMI is limited in terms of its sensitivity to capture changes in adiposity in children.
Despite their limited potential to impact BMI, school interventions have demonstrated effects on behaviours that lead to energy balance (PA and healthy eating) especially when parents are also engaged through the school.\textsuperscript{15} Programs that complement PA and healthy eating intervention activities at school with healthy lifestyle education to children and parents have been found to be successful in positively impacting PA and healthy eating behaviours.\textsuperscript{16, 19}

Few studies have examined the impact of multifactor, multilevel, school-based interventions in developing countries such as Mexico and the evidence from these studies is weak and inconsistent.\textsuperscript{17, 18, 20, 21} More data are thus needed on the effectiveness\textsuperscript{1} of ecologically-driven school-based interventions for the improvement of health behaviours and conditions in developing countries.\textsuperscript{20, 22} Thus, the National Institute of Public Health in Mexico (INSP) launched a comprehensive study to evaluate the effectiveness of an ecologically-based program aimed at promoting healthy eating and physical activity in selected Mexico-city schools to optimize to overall energy balance in childhood as a strategy for obesity prevention.

**METHODS**

The Research, Ethics and Biosecurity (IRB) Commissions of the INSP reviewed and approved the study protocol. Parents provided written informed consent allowing their children to participate in the study. In addition, children were asked to provide oral assent to participate. The intervention and research were carried out over the 2006-07 and 2007-08 school years.

**School Recruitment:** Only public elementary schools meeting the following criteria were considered for study inclusion: 1) located in the south of Mexico City; 2) classified by the Secretaria de Educación Publica (Secretary of Public Education, SEP) as having students of low socioeconomic

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\textsuperscript{1} A program is considered effective when it has been successful in improving outputs (i.e., fitness, body composition or obesity reduction) and also has shown significant effects on food and PA environment and other behaviours (i.e., dietary intake; physical activity improvement) that might be expected to have a positive effect over time on weight status and/or other health risks.
status; 3) receiving benefits from the Federal School Breakfast Program (FSBP) served at schools; 4) possessing the minimum facilities necessary for intervention implementation; 5) possessing the standard SEP-issued set of sports equipment; 6) having an enrollment of at least 350 students; 7) having two or more classrooms per grade; and 8) being a part-time school (i.e., 4.5 hrs/day).  Of a preliminary list of 1,283 schools located in the urban area of Mexico City, provided by the Administración Federal de Servicios Educativos (AFSEDF) - Federal Administration of Educational Services in the Federal District of Mexico, 274 schools located in the 4 “delegaciones” of interest (Xochimilco, Tlalpan, Magdalena Contreras and Coyoacan) were identified.  From the schools located in the delegaciones, 84 schools partially met the inclusion criteria (i.e. were not in the correct delegación, were not considered urban or didn’t have facilities for the implementation), and the school list shrank to 40 eligible schools, all of which agreed to participate in the study by committing to accomplish the study needs (i.e. change food and PA school environment, permit evaluation and implementation activities during school day).  From the 40 eligible schools, 27 schools were randomly selected and assigned to one of three conditions: Basic intervention (n=8), Plus intervention (n=8) and Control (n=11). Thus, intervention strategies where implemented in 16 school intervention schools and were targeted to children in 4th and 5th grades in the first year and 5th and 6th grades in the second year.

**Student Recruitment:** A total of 886 students from 4th and 5th grades (approximately 32 students per school) from these 27 schools were randomly selected for outcome evaluation from 1712 students who agreed to participate and whose parents had provided informed consent; the refusal rate was lower than 20%.  A flow chart of the sample from recruitment to the end of the intervention period is shown in Figure 4.1
Figure 3.1: Consort Diagram of Promoting Healthful Diet and Physical Activity in the Mexican School System for the Prevention of Obesity in Children: Rationale, Design and Methods.

Enrolment

Clusters assessed for eligibility
(274 Elementary schools in Mexico City)

No fulfilling selection criteria 190 schools

Meeting inclusion criteria 84 schools

Randomized cluster 27 schools

Year 1

Allocated to basic intervention 8 schools
Received allocated intervention 8 schools
Baseline participants: 262 randomly chosen for evaluation

Allocated to plus intervention 8 schools
Received allocated intervention 8 schools
Baseline participants: 264 randomly chosen for evaluation

Allocated to control group 11 schools
Allocated to control 11 schools
Baseline participants: 360 randomly chosen for evaluation

Children invited to participate n=2430

Children with informed consent n=1712

Children randomly selected n=886

Year 2

Baseline year 2

Allocated to basic intervention 8 schools
Received allocated intervention 8 schools
Participants: 252 with anthropometric baseline information

Allocated to plus intervention 7 schools
Received allocated intervention 7 schools
Participants: 224 with anthropometric baseline information

Allocated to control group 11 schools
Allocated to control 11 schools
Participants: 354 with anthropometric baseline information

Children lost of follow up n=56

Children recruited for year 2 n=93
**Context of the Study**

The children enrolled in the public Mexican school system attend school for only 4.5 hours a day, either during a morning or afternoon shift. Our study was conducted during the school morning shift. Schools have no cafeteria facilities and only few schools have a canteen. Food availability in schools mostly depends on external food vendors who are chosen by school authorities, based on hygienic standards, to sell foods to students during recess. The intent is to provide students with snack options rather than a full meal, given that children have breakfast and lunch at home and many are beneficiaries of the SBFP.

In regards to the PA environment at school, we identified that there were no opportunities to engage in PA at school with the exception of the weekly 50-minute PE class through the physical education program (PEP). However, the PEP in schools was found to have several shortcomings that limited the quality and the quantity PE classes; these include lack of incentives to motivate physical education teachers, shortage of materials, a lack of appropriate areas for delivering PE classes, and PE class structure that delivers only 9 to 11 minutes of Moderate to Vigorous Physical Activity (MVPA).

**Intervention description**

Intervention content was informed by formative research findings showing that the school setting promotes the intake of unhealthy food and beverages (energy dense foods and sugar-sweetened beverages(SSB), provides limited access to vegetables, fruits and water, offers several opportunities to eat and drink throughout the school period, and does not offer enough opportunities for PA. Recommendations from the literature, ecological principles, the Theory of Planned Behaviour (TPB), Social Cognitive Theory (SCT), Health Belief Model (HBM) and formative research findings were used to guide the development of two program intensities: Basic and Plus.

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The basic program focused on improving norms related to nutrition and PA at the schools and was limited to using existing school infrastructure and resources. The plus program implemented all the components incorporated in the basic program and included additional financial investment and human resources. No changes were made to existing nutrition or PA practices in control schools.

Implementation of both program intensities depended largely on the willingness of principals, teachers and school staff. The aim of the nutrition intervention strategy was to improve the prevailing food environment by increasing availability of healthy food (fruits, vegetables, and non-fried dishes) and beverages (particularly water), by reducing the availability of energy-dense foods and SSB, and reducing the number of eating opportunities during the school day. The aim of the PA intervention strategy was to enhance the prevailing PA environment by increasing the availability of PA resources, by improving infrastructure and enhancing aesthetics. In plus schools only, specialized PE teachers were hired to teach one additional PE class per week for 4th and 5th grade students and to offer 15 to 20 minutes of moderate PA (calisthenics) referred to as “activation period” after the morning civics ceremony four days of each week.

Nutrition and PA interventions were supported by a communication/educational component based on SCT, TPB and HBM to increase student and school staff awareness of program activities and to develop positive attitudes towards PA and healthy eating at schools.

In the second intervention year the same activities were repeated in both the basic and plus schools with the addition of the morning activation periods in the basic schools. Detailed intervention components are summarized in Table 4.1
Table 4.1 Description of intervention implemented by type of program, target group and school year.

<table>
<thead>
<tr>
<th>Nutrition Strategy</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention</strong></td>
<td><strong>Target group</strong></td>
<td><strong>Intervention</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Basic</strong></td>
<td><strong>Plus</strong></td>
</tr>
<tr>
<td>Promote an increase in the availability of healthier food choices</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Promote a reduction in the availability of candy and sweets</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Promote the modification of culinary techniques and ingredients of preparations sold during recess</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Ensure water availability</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Limit the availability of sugared beverages in the school</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Promote a “Fruit and Vegetable Day”</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Limit the sale of certain energy dense foods</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Reduce the exposure to eating opportunities</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Prohibit eating during lesson time and limit “school breakfast” time to 20 minutes</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Activity Strategy</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intervention</strong></td>
<td><strong>Target group</strong></td>
<td><strong>Intervention</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Basic</strong></td>
<td><strong>Plus</strong></td>
</tr>
<tr>
<td>Promote PA during recess and free time: Using an Activity Box</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Improve the quality of PE: One lesson 50 minutes/week</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Improve the school premises and provide sports equipment.</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Engage in Physical Activation: 15 to 20 minutes of activation to all children from Tuesday to Friday.</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Improve quantity and quality of the PE class and MVPA time to 100 minutes/week.

<table>
<thead>
<tr>
<th>Communication and Education supportive component</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provide supportive writing resources such as Pamphlets for PE teachers to improve the quality of PE classes.</strong></td>
</tr>
<tr>
<td><strong>Provide supportive resources such as workshops were provided to PE teachers to improve the quality of PE classes</strong></td>
</tr>
<tr>
<td><strong>Distribute booklets: How to prepare a healthy lunch (for parents). Booklets for vendors on how to improve culinary techniques and sell healthy food</strong></td>
</tr>
<tr>
<td><strong>Provide educational and skills-based workshops with vendors aimed to teach the use of healthier culinary techniques and the preparation of healthier food</strong></td>
</tr>
<tr>
<td><strong>Sensitize school authorities on healthy lifestyles and the benefits of healthy eating and PA (workshop)</strong></td>
</tr>
<tr>
<td><strong>Provide educational and skills-based workshops with children aimed to achieve energy balance at school, promote fruit and vegetable intake and teach how to pack a healthy lunch</strong></td>
</tr>
<tr>
<td><strong>Provide a mass communication and marketing strategy targeted to children to promote four basic behaviours, through messages and concepts: Fruit and vegetable consumption, water consumption, engage in PA and pack a healthy lunch.</strong></td>
</tr>
</tbody>
</table>
Intervention Implementation

This program was a collaborative effort between the INSP, the AFSEDF, and the Dirección General de Educación Física del DF (DEGEDF) - Physical Education General Direction from DF. A team of 12 INSP implementers (2 per school) was assigned to visit each intervention schools equally (2 to 3x/ week) to make sure implementation was carried out properly by school staff. Compliance with the intervention activities was assessed through a comprehensive weekly observational monitoring system, which identified the degree of adherence to each strategy.

Measurement of Study Outcomes

Measurements were obtained over approximately 7 weeks each time at the beginning (baseline) and end (7 months) of the 2006-07 school year and at the beginning (11 months) and end (18 months) of the 2007-08 school year. Measures were either developed or adapted for this study; all measures were pilot tested in 9 to 11 year-old children from public schools in Mexico City. This paper reports on the impact of the intervention on the environment (food and beverage availability and PA opportunities) and student health behaviours at school (food intake and number of steps taken). We also examined changes in obesity prevalence.

Food and beverage availability at school: This information was assessed using food inventories, which determined the quantity and quality of food and beverages at schools’ during recess time. The food and beverage inventories were completed at each school by trained nutritionists during the data collection phase. Foods were classified according to a recommendation list developed by the INSP research team 39 based on nutritional criteria, with the following three categories: highly recommended foods (fresh fruits and vegetables, boiled corn with lemon, no fried low-fat tacos (beans, mushroom, nopales and sorbets). Foods recommended for consumption no more than two times a week (non-fried tacos (meat, potatoes
with sausage, chili pepper with cream), ham sandwich, popcorn, rice with milk (“arroz con leche”, salted peanuts); and non-recommended foods (Candies, ice cream, fried foods, pizzas, hot dogs, doughnuts, milk based gelatin desserts, cookies, SSB). For each school, the overall availability of each of these categories of food and beverages was calculated by adding the total number of available portions of a given food and dividing by the total number of portions sold.

**Potable drinking water availability in schools** was assessed by direct observations (i.e., counting water containers) and reporting the number of liters available within each 4th, 5th, and 6th (only for the second year) classroom at school.

**Food intake at recess:** A direct observation protocol complemented by a close-ended survey was used to assess child food intake and purchasing patterns in a subsample of 8 children per school (4 per grade; n=216 across 27 schools). Field personnel were trained to observe and record the foods and beverages consumed by the children at recess, including estimated quantities. Overall intake was expressed according to above-described food categories for changes across time (i.e., baseline to 7, 11, and 18 months) within conditions (i.e. basic, plus, and control) and expressed in percent of change relative to baseline. We used analytical weights for the total number of foods eaten by each individual to avoid giving excessive weight to the children who only consumed a small number of foods.

**Physical activity opportunities during PE classes and recess:** Trained observers assessed the quality of PE lessons by recording students’ levels of PA using SOFIT (System for Observing Fitness Instruction Time) a standardized direct observation instrument. This methodology has been described elsewhere. Briefly, the observers recorded the intensity of PA and class context using a time-sampling system of 10-second intervals. Observers coded intensity of PA as: (1) lying, (2) sitting, (3) standing, (4) walking, or (5) more active (e.g., requiring more energy than ordinary walking). In addition to PE classes, PA during recess time was also assessed using an adapted version of SOFIT described elsewhere. One PE class and one recess were observed at
each school. \textsuperscript{9-40} Time spent in MVPA during PE classes and recess at school was obtained by adding the time spent in the two most intense categories of the SOFIT (walking and more active).

**Children’s physical activity (steps taken) at school.** Steps were measured by NL-1000 pedometers (NEW-LIFESTYLES, Lee’s Summit, MO).\textsuperscript{41} Participants wore the pedometers for five consecutive days starting on Monday morning upon arrival at school. Each pedometer was programmed to restart every day at 08:00 hours when the school day began. Based on our baseline data\textsuperscript{9} we estimate that this total represents approximately 30\% of total daily PA. Adequate PA for the all-day step measurement was defined as 12,000 steps for girls and 15,000 steps for boys on the basis of standards for children suggested by Tudor-Locke and colleagues.\textsuperscript{42} This created a cut-off for steps accumulated during the school day at 30\% of the all-day cut-off proposed, which equated to 3600 steps for girls and 4500 steps for boys. We then calculated the percentage of participants who reached these cutoffs during school hours at each data collection period and categorized participants as: 1) improved (i.e., participants who improved progressing from not reaching to reaching cutoffs); 2) declined (i.e., participants who regressed from reaching to not reaching cutoffs); and 3) stagnant (i.e., participants who neither improved nor declined). These measurements have been reported previously and were sufficiently sensitive to detect differences in intervention groups after the first year of intervention.\textsuperscript{43}

**Overweight and Obesity:** Body mass index (BMI) was calculated as weight (kg) / height (m\(^2\)). Height was measured to the nearest 1 mm using a Dynatop stadiometer and weight was measured to the nearest 0.1 kg using a portable electronic scale (Tanita).\textsuperscript{44} The age- and sex-specific International Obesity Task Force (IOM) BMI cut-points were used to classify participants as non-overweight or overweight/obese.\textsuperscript{45}
**Statistical Analyses**

**Sample sizes**

Environmental outcomes were measured at the school level, while behavioural outcomes and BMI were measured at the individual level.

The power calculation was based on the 40% prevalence of overweight and obesity observed during a previous formative evaluation phase in Mexico City schools, and the expected change between groups. Thus, the sample size required to detect a 10% difference between groups was calculated to attain a power of 0.8 and a type I error (alpha) <0.05 (two-tailed), using an intra-class correlation coefficient (ICC) of 0.08. This calculation yielded a minimum sample size of 8 schools, in each of the two intervention groups (described below) and 8 schools in the control group, with 240 children per group for anthropometric measurements. Annex 1 shows the sample size calculation and the randomization methodologies.

Sample size was calculated using Murray’s formulas (1) and (2)\(^6\)

\[
ICC = \frac{DEFF - 1}{m - 1} \quad (1)
\]

\[
\Delta' = \sqrt{\frac{2\sigma^2(1+ (m-1) ICC)}{(m g)^2} \left(z_{\alpha/2} + z_{\beta}\right)} \quad (2)
\]

Where:

“DEFF” = Design effect based on BMI in 12 formative phase school (1).

“m” = average children per schools; \(\sigma\) = SD of a random sample size; \(z_{\alpha/2}\) = Z value for p=0.05 and two tails (1.96); \(z_{\beta}\) = Z value to get power of 80% (0.84); \(g\) = Number of cluster (12 schools) (2).

The number of children selected to assess opportunities to engage in moderate to vigorous physical activity (MVPA) in physical education (PE) classes and recess, and the number of children selected for the evaluation of food intake were based on the largest possible number given logistic and financial restrictions of direct observation methodologies. Given that we had
additional funding for evaluation 3 schools were added to the control condition since attrition in this condition was more likely.

**Data Analysis.** The analyses examined changes in both individual-level variables (overweight/obesity, food intake, number of steps taken) and school-level variables (food availability and MVPA in PE classes and recess). At the individual-level, we employed an intent-to-treat analysis and thus included all participants in the analysis for all time points. For those participants with missing data (i.e., 20%), data imputations were performed by imputing the mean change score from the other children of that school who were of the same sex. General linear models (GLM) were used to examine within and across group differences in mean BMI values and number of steps taken from baseline to month 7, month 7 to month 11, month 11 to month 18, and baseline to month 18.

We used logistic regression to test the effect of the intervention program on reaching step cut-offs at baseline and follow-up and calculated robust SE to account for the effect of school. These analyses controlled for sex and were conducted using SPSS Statistics Software, (version 19), IBM Chicago.

For the analysis of food intake we determined the children’s intake in percentage for the three food categories previously described and calculated the average effect by difference-in-difference, considering the interaction of treatment variables with every time point using a random-effects regression model. In the model we considered analytical weights for the total number of foods eaten, and the correlation within schools. These analyses were also adjusted for sex and age. This analysis was carried out using STATA software version 9.0.

The prevalence of overweight and obesity at the school-level was calculated using the BMI (kg/m²) index. Children were categorized as non-obese, overweight, or obese using the age and gender specific BMI cut points suggested by the IOM.
At the school-level, because the interventions and the sample size varied from year one to year two, we examined changes in food availability and the unit of analysis was schools. General mixed models were used to examine within and across group differences in food availability from baseline to month 7, and from month 11 to month 18.

To determine minutes of MVPA in PE classes at the schools, we estimated the mean differences using a linear regression model from baseline to month 7 and from month 11 to month 18, adjusting for sex, age and study design. These analyses were carried out using STATA software version 9.0.

RESULTS

Baseline Characteristics

During the first year, the research was conducted in 27 schools. These schools had between 316-755 students, 11-20 school teachers, and 1-2 PE teachers, each. School characteristics did not vary across the three conditions (data not shown). During the second year of intervention, one of the plus schools became a full-time school (longer duration of school period with a formal main meal included and changes in curricula) and was thus no longer eligible for inclusion in the study.

The baseline sample of 886 children was reduced to 830 students due to concerns about inconsistent information from 56 children. At baseline, the children were 9.7 years old +/- 0.7 years and had a BMI of 19.8 +/- 3.7 kg/m2. The combined prevalence of overweight and obesity was 43%, with no differences across Basic, Plus, and Control groups. Table 4.2 describes the characteristics of children for the intervention conditions and the control group at baseline.
Changes in Food and Beverage Availability at Schools

There were significant changes over time in the distribution of food available among the three categories of food over the two years of intervention. These changes were characterized by an increase in the percentage of highly recommended food and by a reduction in the percentage of non-recommended food items in both intervention schools relative to control schools from baseline to 18 months (p<0.05). The availability of recommended foods increased significantly over time (p<.05) in plus schools (i.e., from 18% at baseline to 52% at 18 months). In basic schools, significant changes (p<.05) were also documented across the assessment periods from baseline (24%) to 18 months (55%). Non-recommended food availability decreased significantly (p<.05) in plus schools from a baseline high of 50.7% to 15.7% at 18 months. In basic schools a reduction in non-recommended food was also observed from baseline (44.4%) to 7 (22.55) months and from 11 (25.6%) to 18 (15.7%) months. Changes in food availability in all categories at the intervention and control schools are shown in Table 4.3.

Table 4.2 Descriptive characteristics of study groups at baseline

<table>
<thead>
<tr>
<th></th>
<th>TOTAL (n = 860)</th>
<th>Intervention Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control (n=354)</td>
<td>Basic (n=252)</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>Boys (%)</td>
<td>50</td>
<td>51.4</td>
</tr>
<tr>
<td>Age (y)</td>
<td>9.7</td>
<td>0.7</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>38.6</td>
<td>9.8</td>
</tr>
<tr>
<td>Height (cm)</td>
<td>138.8</td>
<td>7.1</td>
</tr>
<tr>
<td>BMI kg/m²</td>
<td>19.8</td>
<td>3.7</td>
</tr>
</tbody>
</table>

¹Standard deviation or as specified
²Mean and percentage comparison adjusted for study design. No difference among groups (p>0.05)
Changes in Potable Water Availability at Schools

Another change in the environment in intervention schools was the availability of potable drinking water, which increased significantly (p<0.05) relative to control during both years. At the beginning of the intervention none (0%) of the schools had potable drinking water available, however by the end of year one (7 months), 63.4% of the 4th and 5th grade classrooms in basic schools and 73.2% of the classrooms in plus schools had potable drinking water available while none of the control schools had potable drinking water. For the second year of intervention (11 months) 19.5% of classrooms in basic schools, 0% of classrooms in plus schools, and 8.8% classrooms in control schools had water available. By the end of year two (18 months) the water availability in basic schools improved to 92% and 62.2% in plus schools whereas the control schools improved to 11.1% (data not shown).
Changes in time spent in MVPA in PE Classes and Recess at Schools

The changes in MVPA in children during PE classes and recess were not significant. Between baseline and 7, 11, and 18 month assessments, the number of MVPA minutes of PE varied only slightly by intervention group, ranging from 2.9 to 4.0 minutes between groups and assessment periods. Similarly, at recess the overall differences in MVPA minutes did not vary significantly (i.e., from 2.8 to 3.9 minutes) between groups and assessment periods. The mean...
differences in MVPA in children across two years of intervention are presented by PE classes and recess in Table 4.4

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>Control Schools</th>
<th>Basic Schools</th>
<th>Plus Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Education Class</strong></td>
<td><strong>Mean</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td><strong>95% C.I.</strong></td>
<td><strong>Mean</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Year 1 Baseline</td>
<td>16.1</td>
<td>14.5-17.7</td>
<td>16.0</td>
</tr>
<tr>
<td>Year 1 7 Months</td>
<td>19.9</td>
<td>18.4-21.4</td>
<td>20.0</td>
</tr>
<tr>
<td>Year 1 Difference&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.8</td>
<td>1.6-6.0</td>
<td>4.0</td>
</tr>
<tr>
<td>Year 2 11 Months</td>
<td>18.7</td>
<td>17.2-20.3</td>
<td>19.2</td>
</tr>
<tr>
<td>Year 2 18 Months</td>
<td>21.9</td>
<td>20.4-23.4</td>
<td>22.3</td>
</tr>
<tr>
<td>Year 2 Difference&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.2</td>
<td>1.0-5.3</td>
<td>3.1</td>
</tr>
<tr>
<td><strong>Recess</strong></td>
<td><strong>Mean</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
<td><strong>95% C.I.</strong></td>
<td><strong>Mean</strong>&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Year 1 Baseline</td>
<td>9.1</td>
<td>7.5-10.5</td>
<td>9.4</td>
</tr>
<tr>
<td>Year 1 7 Months</td>
<td>13.0</td>
<td>11.6-14.5</td>
<td>13.0</td>
</tr>
<tr>
<td>Year 1 Difference&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.9</td>
<td>1.8-6.1</td>
<td>3.6</td>
</tr>
<tr>
<td>Year 2 11 Months</td>
<td>12.0</td>
<td>10.5-13.5</td>
<td>12.3</td>
</tr>
<tr>
<td>Year 2 18 Months</td>
<td>15.0</td>
<td>13.5-16.5</td>
<td>15.6</td>
</tr>
<tr>
<td>Year 2 Difference&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.0</td>
<td>0.9-5.1</td>
<td>3.3</td>
</tr>
</tbody>
</table>

<sup>a</sup> Confidence Intervals estimates by xtgee, adjusted by baseline measurement, sex, age and design study.
<sup>b</sup> Mean of the difference within year estimated by simple linear regression model adjusted by sex and age
All mean differences within year P value >0.05
Changes in Children’s Food Intake during Recess

Quality of food intake changed considerably over the two years of intervention. Children’s intake of highly recommended and recommended for consumption twice a week food items increased in intervention schools when compared to the control group at each of the assessment periods (7, 11, 18 months). The increase in highly recommended food intake was notable even though not all of the differences were statistically significant. The intake of highly recommended foods increased in plus schools from baseline (16%) to 7 months (30%), 11 months (25.5%) and 18 months (33.9%) months. In basic schools, meaningful changes were also documented across the three assessment periods. However, not all the changes were statistically significant in basic schools relative to changes in the control group.

Moreover, a significant decrease in the intake of non-recommended foods was documented in intervention schools relative to control schools in three out of four assessment periods. Overall, the children’s food intake changes were notable across the majority of the assessment periods and decreased from 59 to 24.6% in the plus group and from 58 to 36% in the basic group. Changes in the quality of children’s food intake by group are presented in Table 4.5
Table 4.5: Change in classification of food consumption (purchase at school) by intervention group in Mexico City’s public school (panel analysis)

<table>
<thead>
<tr>
<th>Foods highly recommended</th>
<th>Intervention Group</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control (n=383)</td>
<td>Basic (n=261)</td>
<td>Plus (n=234)</td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td>Baseline</td>
<td>17.6</td>
<td>17.4</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td>7 months</td>
<td>25.3</td>
<td>32.6</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>11 months</td>
<td>14.4</td>
<td>23.9</td>
<td>25.2</td>
</tr>
<tr>
<td>Year 2</td>
<td>18 months</td>
<td>28.5</td>
<td>34.8</td>
<td>33.9</td>
</tr>
</tbody>
</table>

Change by treatment group and period^a

<table>
<thead>
<tr>
<th></th>
<th>Baseline to 7 months</th>
<th>11 months to 18 months</th>
<th>Baseline to 11 months</th>
<th>Baseline to 18 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>-3.2</td>
<td>-10.0</td>
<td>-6.8</td>
</tr>
</tbody>
</table>

Foods recommended for consumption twice a week

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>21.4</td>
<td>24.8</td>
<td>25.1</td>
</tr>
<tr>
<td></td>
<td>7 months</td>
<td>25.0</td>
<td>43.5</td>
<td>45.5</td>
</tr>
<tr>
<td></td>
<td>11 months</td>
<td>28.4</td>
<td>33.3</td>
<td>39.5</td>
</tr>
<tr>
<td></td>
<td>18 months</td>
<td>26.2</td>
<td>28.9</td>
<td>40.4</td>
</tr>
</tbody>
</table>

Change by treatment group and period^a

<table>
<thead>
<tr>
<th></th>
<th>Baseline to 7 months</th>
<th>11 months to 18 months</th>
<th>Baseline to 11 months</th>
<th>Baseline to 18 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>-2.3</td>
<td>-1.5</td>
<td>-0.7</td>
</tr>
</tbody>
</table>

Foods not recommended

<table>
<thead>
<tr>
<th></th>
<th>Year 1</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>61.3</td>
<td>58.0</td>
<td>59.0</td>
</tr>
<tr>
<td></td>
<td>7 months</td>
<td>49.2</td>
<td>24.1</td>
<td>24.3</td>
</tr>
<tr>
<td></td>
<td>11 months</td>
<td>57.4</td>
<td>42.8</td>
<td>34.0</td>
</tr>
<tr>
<td></td>
<td>18 months</td>
<td>45.3</td>
<td>36.1</td>
<td>24.6</td>
</tr>
</tbody>
</table>

Change by treatment group and period^a

<table>
<thead>
<tr>
<th></th>
<th>Baseline to 7 months</th>
<th>11 months to 18 months</th>
<th>Baseline to 11 months</th>
<th>Baseline to 18 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>-0.7</td>
<td>-11.6</td>
<td>-6.3</td>
</tr>
</tbody>
</table>

Random effects regression model. *p<0.1, **p<0.05
^Reference: control group
Changes in Children’s Physical Activity (steps taken)

Year one intervention impact on steps taken has been previously published. In brief, the number of steps taken during school decreased in control schools (from 4490; 95%CI=4274,4706 to 3850 95%CI=3617,4084) and increased in basic (from 3323; 95%CI=3127,3520 to 3964 95%CI=3776,4153) and plus schools (from 3724; 95%CI=3505,3943 to 4410 95%CI=4197,4624) from baseline to the final year (7 months). Only detailed information of year 2 impact results are presented here. Steps taken increased in a significant manner only in the basic (491; 95%CI=123,860) group; however, the plus group showed an increasing tendency (145; 95%CI=-459,748) and the control group decreased (-630; 95%CI=-1231,-28). The increase in steps taken in the basic group was significantly higher relative to the control group (p<0.05) after controlling for baseline steps. Furthermore in year 1, in the basic group, 25% of children improved from not reaching to reaching the cut off point (p<0.001), and in plus group 36.4% improved from not reaching to reaching the cut off point (p<0.001). For year 2, in the basic group, significantly (p=0.003) fewer children (5.12%) decreased their activity from reaching the in-school cut-off for activity to not reaching the cut-off from baseline to follow-up relative to that of the control group (12.16%). In contrast, 4.65% (p=0.06) of children in basic schools and 2.15% of children (p=0.03) in plus schools maintained a status of reaching the cut off for steps in school relative to students in the control group (12.16%).

The percentage of children who improved from not reaching the cut-off point to reaching the cut off point was not significant, although more improvement was seen in children from the intervention groups (11.6 % for basic, 21.09 % for plus) as compared to the control group (8.11 %).

Changes in Overweight/Obesity

Table 4.6 presents obesity prevalence and BMI means by group across the four assessment periods. The prevalence of overweight and obesity in children changed across the
evaluation period (measured at the 7, 11, 18 month assessments) by type of intervention group. During year one, the prevalence of overweight and obesity decreased in all three groups relative to baseline. During year two, the prevalence decreased similarly from 11 to 18 months. However, the highest reduction in prevalence of overweight and obesity was observed in children from basic schools (from 12.1 to 10.9 %), whereas children from both the plus (10.7 to 10.0%) and the control groups (17.9 to 17.1%) had a smaller reduction and these changes were not statistically significant.

Although BMI changed significantly across intervention groups from baseline compared to the 7, 11, and 18 months assessments, changes were not in the anticipated direction. There was a BMI reduction in children in control schools from baseline to months 7, 11 and 18 and an increase in BMI in basic schools from baseline to 7, 11 and 18 month. Overall, the interaction between intervention duration and type for BMI was significant (F, 10.34, p<0.001). There was a significant difference in BMI between baseline and 7 months (F, 11.48, p<0.001); between 7 months and 11 months (F, 10.46, p<0.001); and between baseline vs. 18 months (F, 11.92, p<0.001).
Table 4.6 Body Mass Index (BMI) by type of interventions across four time measurements adjusted by sex

<table>
<thead>
<tr>
<th>Intervention Group</th>
<th>Control (n=354)</th>
<th>Basic (n=252)</th>
<th>Plus** (n=224)</th>
<th>Plus** (n=254)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence of Overweight and Obesity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>19.5</td>
<td>11.9</td>
<td>12.0</td>
<td>12.7</td>
</tr>
<tr>
<td>7 Months</td>
<td>17.0</td>
<td>11.3</td>
<td>11.2</td>
<td>12.2</td>
</tr>
<tr>
<td>Year 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Months</td>
<td>17.9</td>
<td>12.1</td>
<td>10.7</td>
<td>-</td>
</tr>
<tr>
<td>18 Months</td>
<td>17.1</td>
<td>10.9</td>
<td>10.0</td>
<td>-</td>
</tr>
<tr>
<td>BMI, kg/m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline</td>
<td>19.9</td>
<td>19.5-20.3</td>
<td>19.4</td>
<td>20.0</td>
</tr>
<tr>
<td>7 Months</td>
<td>18.4</td>
<td>17.8-19.1</td>
<td>19.8</td>
<td>18.5</td>
</tr>
<tr>
<td>Year 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Months</td>
<td>18.9</td>
<td>18.3-19.6</td>
<td>20.1</td>
<td>18.7</td>
</tr>
<tr>
<td>18 Months</td>
<td>19.1</td>
<td>18.4-19.8</td>
<td>20.4</td>
<td>19.0</td>
</tr>
</tbody>
</table>

**Given the loss of a plus school in year 2, which resulted in a reduced sample size of 30 students, analysis results are presented for both sample sizes.
DISCUSSION

This school-based intervention program was effective in improving the food environment and healthy behaviours in children during the school day, including healthy eating and PA, through a set of regulations, without the need for large investments. This is one of the first studies to examine the impact of a multifactor, multilevel, school-based intervention in Mexico. These findings are consistent with previous research showing that environmental interventions in schools can impact food availability. Our results show that only when schools were supplied water did the availability increase in a significant way. This finding shows the urgent need to advocate for a sustained water source in the Mexican School System.

At the individual level, improvements in food intake were noted. Statistically significant reductions were documented in the intake of non-recommended food and beverages in the plus intervention schools during both study years and in the basic intervention schools during the first study year. This suggests that improvements in the school food environment translated into reductions in the overall intake of unhealthy foods. This change in intake is particularly remarkable given that children were free to bring food from home in addition to purchasing food at school. It may be that the school intervention, which was promoted to parents through school-bag correspondence, served to enhance parental awareness about providing healthy snacks to their children. This pattern further strengthens the evidence linking the school environment (i.e., food availability) to individual-level behaviour (i.e., food intake) and is consistent with previous evidence from developed countries. Furthermore, the deterioration of the food environment noted in schools where no intervention was occurring, attests to the risk of increasing the obesogenic environment when nothing is done.

In contrast to the findings for the nutrition component of the intervention program, the PA component of the intervention program appears to have been less successful. The most likely
explanation for the lack of change in children’s MVPA during PE class may be related to implementation integrity.54 Unlike the nutrition intervention, which was not subject to interruptions and was implemented as planned,55 over 30% of the scheduled PE classes were canceled during the intervention period43 reducing the variability in PE class opportunities between intervention and control schools. This finding is not unusual as schools have limited space and must often make room for other activities occurring in the school (e.g., school assemblies, picture day, etc). The prioritization of other activities over PE has been reported elsewhere3, 56, 57 and remains a constant challenge for schools. This may be especially true in the Mexican context where the double school-shift is necessary because of a lack of human resources (including PE teachers) and school infrastructure.9

The positive increase in steps taken among children from the intervention schools should not be considered contradictory to the findings for MVPA during PE classes because of the greater variability in treatment conditions conducive to step taking. The intervention schools offered morning activation sessions on most school days whereas control schools did not offer these sessions. It is conceivable that these opportunities translated into more steps taken. These results are comparable to findings from other studies where the PA in schools increased despite the PE class quality.27, 58, 59

In terms of steps taken, the effects were higher in year one.43 It may be that effects observed in year two were more modest because there was not much room for improvement. If we had analysed and reported the two year intervention results together, the findings might have had more coherence with the rest of the results presented in this paper. Nonetheless these findings suggest that the PA and PE environment in Mexico can be improved and children can engage in more PA at schools through comprehensive interventions that address school environmental and individual needs.
The intervention program had no significant effect on the prevalence of overweight and obesity or children’s BMI. A potential reason is that basic schools did not have strict control over food availability; the children had access to SSB and other energy-dense food items during year one and two (food and beverages recommended for consumption only twice a week), which could have affected children’s intake and thus, BMI. Moreover, the intervention did not control for serving (serving sizes or number of servings per day), so it is possible that children increased their energy intake through the consumption of highly recommended foods and the food recommended for consumption only twice a week. Thus, even when the intervention managed to change the quality of the food available at intervention schools, it didn’t restrict the energy intake in children which may have contributed to the BMI increase. The BMI reduction in control schools could have happened because these schools had higher BMI at the beginning of the intervention and had a bigger sample size, relative to basic and plus schools.

Overall, the intervention program did not impact BMI, since control and intervention schools had very similar outcomes. This finding is similar to what others have previously reported for these types of intervention programs, especially when the intervention duration and exposure are low.\textsuperscript{21,60,61} Our intervention program did not have an extended length (i.e., more than two years) nor did it pursue family or community changes. The time that children spend in school is not even 25% of the day and this duration may not be sufficient to impact children’s overall intake during the day. These results bring to the attention the debate of the BMI impact in school based interventions and whether is feasible to attain biological change in this setting. These findings are comparable to results from interventions implemented in developed and developing countries, which have not impacted BMI even when the intervention was longer\textsuperscript{27,62} being more comprehensive, or including family and community environments.\textsuperscript{21}

Despite the lack of impact on BMI prevalence, we were successful in implementing a multifactor multilevel intervention that was designed to tackle the specific obesogenic situation in
the Mexican school system as the literature recommends.\textsuperscript{2–3} Our school based intervention program successfully improved the environment and modified practices among students and in school communities using a SEM, which represents a contribution to the field given the lack of evidence in the childhood obesity prevention area.\textsuperscript{63, 64} This finding is similar to other intervention studies\textsuperscript{65–69} carried out in developing countries and supports the use of SEM approach to prevent childhood obesity in the school setting.

The evidence derived from this study has already impacted the Mexican Health System since several policy strategies that have been derived from this study, such as the Mexican National Guidelines for Healthy Eating in Schools. These Guidelines include a series of regulations and recommendations related to the sale and distribution of foods inside the schools to promote healthy eating, including the control of portion sizes, and activities and curriculum change to promote PA in these settings. The Guidelines are currently being implemented in all schools in Mexico and have influenced the availability and accessibility of healthier foods and opportunities for PA in schools across the country. Thus, the results of this project have already impacted policy development in schools, which has the potential to promote health behaviours on a population wide scale.

To summarize, despite the lack of change in BMI, statistically significant impacts were documented in known environmental and behavioural obesity risk factors. This is important because improvements in school environments could result in an increase in children’s healthy behaviours in México. The knowledge and the experience generated in this project add to the design and implementation of the Mexican National School Guidelines would likely to improve healthy school environment and behaviours in the Mexican School System to prevent childhood obesity.
Limitations of this study include attrition; during year two we lost a plus school and lost approximately 20% of our sample over the two years of intervention. In order to compensate for this loss, we applied intent to treat analysis by imputing missing variables as suggested (by age and sex) by the RCT literature.47

Another limitation was that the FSBP, which increased food intake in children, was not under INSP control. Thus, we were unable to make recommendations about the content of the breakfast, which was often in contradiction to the highly recommended food and beverages list. Finally, our trial did not control for servings (total calories per serving or number of servings during the day), so it is possible that children may have increased their energy intake through the consumption of healthier food.

To our knowledge, this is among the first multilevel, multifactorial programs carried out in Mexico City to prevent childhood obesity in schools. Despite certain limitations, the results reported are extremely important since this SEM school based program was successful in creating a supportive school environment for health that translated into improved food intake and increased steps in children. These findings substantiate the conclusion that establishing a healthy food and PA environment at schools can promote healthy lifestyles in children, which may represent a first step towards obesity prevention.2, 3, 20, 60, 62 This evidence is useful for a developing country like Mexico which is lacking in evidence to guide obesity prevention efforts.14, 58, 62, 63 This evidence is timely as momentum is building and national efforts are being rolled out to address the obesity problem in Mexico.
REFERENCES


39. Rivera JA, Ramírez-Silva CI. Documento Técnico de Recomendaciones para Guías de Alimentación en Escuelas Primarias Públicas. Caracterización del Ambiente Escolar en Escuelas...


64. Institute of Medicine, Youth CoPoOiCa, editors. Preventing Childhood Obesity: Health In The Balance Washington D.C: National Academy Press; 2003.


CHAPTER 5: MANUSCRIPT 3

An ecological and theoretical deconstruction of a school-based obesity prevention program in Mexico

Margarita Safdie PhDc, Margaret Cargo PhD, Lucie Richard PhD, Lucie Lévesque PhD.

Acknowledgments:
The authors are grateful to all the health promotion practitioners from the INSP who took part in the study. The authors would like to thank Iordan Kostandinov for his assistance in the data coding. We would also like to thank Leni Martin del Campo, and Catalina Torres for their help with data collection and brief reports writing.
ABSTRACT

Ecological intervention programs encompassing a diversity of strategies in a variety of settings are recommended to prevent overweight and obesity in children. The National Institute of Public Health (INSP) in Mexico implemented an innovative and successful ecological intervention program to modify the school environment to promote healthy lifestyle behaviours in school-aged children. The purpose of this study was to assess the integration of ecological principles and Social Cognitive Theory (SCT) constructs in this successful school-based obesity prevention program implemented in 15 elementary schools in Mexico City. The Intervention Analysis Procedure (IAP), was used to “map” the integration of ecological principles and a theoretical checklist was used to gauge the use of theory. Results showed that 32 distinct intervention strategies were implemented in the school setting to engage four different target-groups (students, parents, school representatives, government) across two domains (Nutrition and Physical Activity); The most frequently used SCT construct within both intervention domains was Reciprocal Determinism. Findings provide new insight into a promising combination of strategies and theoretical constructs that can be used to implement an effective ecologically founded school-based obesity prevention program. The deconstruction of a successful Mexican intervention program that has documented environmental and student behaviour improvements provides novel information for the implementation of multifactorial interventions in school-based health promotion programs.

Key words: Ecological approach, IAP coding, Childhood obesity, Physical Activity, Nutrition, Social Cognitive Theory
INTRODUCTION

The rate of overweight and obesity in Mexican children is growing at an alarming pace. National surveys reveal that the prevalence of overweight and obesity in school-aged children increased from 18.4% in 1999 to 26.2% in 2006 to 30.3% in 2008. In 2006-2008, the school environment in Mexico was considered to be “obesogenic” because of restricted opportunities for physical activity (PA) and enhanced opportunities to consume energy-dense products. High-fat foods and sugar-laden beverages low in nutritional value were available to students during five daily eating opportunities. Given this context, effective strategies to address this serious public health problem are deemed critical.

Ecologically-founded intervention programs that encompass a diversity of strategies to engage different stakeholders in a variety of settings are recommended to prevent overweight and obesity in children. In 2006, the National Institute of Public Health (INSP) designed and implemented an innovative and successful intervention program to modify the school environment to promote healthy lifestyle behaviours in 4th, 5th, and 6th grade students. This intervention program was designed according to ecological principles that recognize the reciprocal relationship that exists between individuals and their environment, was based on formative research, and behavioural theories such as Social Cognitive Theory (SCT).

The premise underlying ecological programming is that a multilevel program is likely to be more effective because it affords the opportunity to encounter the same behavioural prompts (e.g., to be more physically active) from a variety of sources (parents, teachers, coaches) in a variety of settings (home, school, community). Therefore, an intervention program that contains several and diverse strategies to engage several different stakeholders in several different settings might address the health behaviour in a more comprehensive way and thus yield better results than a simpler program (i.e., fewer targets, fewer settings). Despite its intuitive appeal and an increase in the use of ecological principles for programming to prevent childhood obesity in
developed countries,\textsuperscript{18} optimal combinations of interventions to promote healthy lifestyles have yet to be identified. In addition to determining optimal combinations of interventions, health promotion practitioners striving to integrate ecological principles into their programs must also strive to develop programs that are theoretically well founded. Challenges to theoretical integration include practitioner difficulties in operationalizing and assessing theoretical constructs.\textsuperscript{19}

The purpose of this study was to assess the integration of ecological principles and theoretical constructs in a school-based obesity prevention program in Mexico City, that was successful in creating a supportive environment for healthy behaviours.

**BACKGROUND**

Conceptual frameworks of the ecological approach present health as resulting from the interdependence between the individual and his or her ecosystems of family, community, physical, social and political environments.\textsuperscript{12, 20} Health promotion practitioners endeavoring to apply an ecological approach are tasked with considering and leveraging the multiple influences within these ecosystems to guide comprehensive intervention strategies to impact behaviour and health. This approach is widely used and accepted for guiding interventions.\textsuperscript{21, 22}

A recent review of the usefulness of an ecological approach shows that most of its applications have been to enhance physical activity (PA) and healthy eating.\textsuperscript{18} In the literature, there are examples of effective nutrition and PA initiatives in schools to improve children’s opportunities for health based on an ecological approach.\textsuperscript{23, 24} However, there is a lack of guidance about optimal combinations of interventions to replicate successful intervention efforts.

Social Cognitive Theory (SCT)\textsuperscript{13} is consistent with an ecological approach because it is founded on the concept of ‘reciprocal determinism’ between intrapersonal factors (i.e., individual thoughts, beliefs, and attitudes) and environmental factors.\textsuperscript{13} This theory is widely used for the design of ecologically framed healthy eating and PA intervention programs.\textsuperscript{25-27} The hypothesized
reciprocity in which behaviour, cognitive factors, and environments all operate as interacting determinants (RD); “Self-efficacy” (SE), defined as a person’s perceived ability to successfully perform a given behaviour; Behavioural Capacity (BC) to engage in a change, which depends on knowledge (about what do to) and skills (about how to do it) related to a behaviour; and Reinforcement (R), which refers to ways in which a preferred behaviour can be encouraged or an undesired behaviour can be discouraged, are the known hallmarks of SCT, yet little guidance exists as to optimal combinations and “doses” of these constructs required to achieve behavioural change.19, 28, 29

The impact evaluation of a school-based ecological intervention program in Mexico documented improvements in children’s behaviours and the school environment.30 A detailed evaluation of the ecological and theoretical elements implemented within this program constitutes a first step in understanding how these behaviour and environmental changes occurred. A mapping of the integration of ecological principles and theoretical constructs involved in this successful Mexican school-based intervention program can help health promoters in emerging countries like Mexico replicate successful intervention programs in an effective and efficient manner.

Study aims were: 1) to identify the number and type of strategies implemented to encourage student healthy eating and PA at school (e.g., How many strategies aimed to change the food environment? How many strategies aimed to change the PA environment? What were the social and environmental targets for change and how were these configured to eventually impact the children? and, 2) to describe the use of SCT theoretical constructs within the two intervention domains (e.g., Were some SCT constructs used more than others? Were SCT constructs used differently within the nutrition and PA domains?).
METHODS:

Context of the study

The INSP school-based obesity prevention program was designed according to a simplified ecological model (SEM) proposed by McLeroy (1988), was based on formative research\(^9, 10\) and was founded on Social Cognitive Theory.\(^13\) Four levels of influence were targeted for change: individual (students), interpersonal (teachers, school staff, and parents), organizational (schools), and political (Secretaria de Educacion Publica -Secretary of Public Education, SEP).\(^12\) Interventions aimed to influence child knowledge, beliefs, and behaviours related to PA and healthy eating; parent and teacher knowledge, beliefs, and behaviours about PA and healthy eating; and school and SEP policies affecting students’ PA practices and eating patterns at school.

The program included two intervention domains: Nutrition and Physical Activity (PA). Interventions were also supported by a communication and education component. A detailed overview of the intervention activities is presented by Safdie et al.\(^4\) In brief, the intervention program was implemented and evaluated using an experimental design in 27 schools (16 intervention, 11 comparison schools) in Mexico City. The intervention program was implemented by INSP staff over approximately 8 months per year for two years during 2007 and 2008. Comparison schools did not receive the intervention program.

The overall purpose of the intervention program was to improve the food and PA school environment as a way to promote healthy behaviours in children. Therefore the aim of intervention activities within the Nutrition domain was mainly to enhance the availability of healthy food and water whereas the aim of the PA intervention activities was to increase opportunities for moderate-to-vigorous PA (MVPA) during recess and Physical Education (PE) classes at school. The aim of the communication and education component was to support healthy practices at schools; to promote positive attitudes, and values towards healthy behaviours among
teachers, food vendors, parents, and children through educational activities and persuasive messaging.

Trans-Domain policy activities included meetings with the SEP at the provincial and federal levels to improve the practices and guidelines regarding PE classes and healthy eating in schools. Organizational activities included improving the quality of food and beverages available at schools through a recommendation list and food vendor training; improving the school infrastructure to be more PA friendly; and, posting and distributing communication materials at schools. Interpersonal activities included meetings with parents and the distribution of printed educational materials. Individual activities included dietary and PA workshops targeted to children.

An impact evaluation was conducted using a mixed methodology and focused on school environment indicators (i.e., food and beverage availability and PA opportunities), children’s health behaviours (i.e., food consumption and steps taken), and children’s body composition indicators. The intervention was successful¹ and results showed that in the intervention schools, the availability of healthy foods and beverages increased in a significant manner with a concomitant decrease in unhealthy food availability. During the two year intervention children’s food intake improved and the number of steps taken during the school day increased significantly; body mass index in children did not change. A detailed description of the project impacts during its two year implementation is provided elsewhere.³⁰,³¹

Data Collection

For the purposes of this analysis, we examined the intervention activities implemented across 15 intervention schools in year 2 of the program (due to a program change, one of the

¹ From a health promotion perspective an intervention is considered to be successful, if it improves the school food and PA environment and/or influence positively students’ behaviours and reduced obesity risk factors.
intervention schools no longer met the inclusion criteria in year 2). We focused the analysis on year 2 activities because the intervention activities had been refined from year one, that the intervention staff had more experience, and adherence to the program model was enhanced relative to year one. Relationships between SEP, school staff, and INSP were also better established during the second year.

All project documents (i.e., project intervention meeting minutes, implementation journals, monitoring forms, institutional communications between SEP, schools and INSP, and SEP meeting minutes) related to the Nutrition and PA domains, were compiled and sorted into reports according to setting, target group and objectives of the intervention. This yielded 25 distinct activity reports.

In order to complement missing information and to validate the content of activity descriptions, we conducted discussion groups with, and submitted close-ended questionnaire to 15 project staff who were in charge of specific strategy execution or who played key roles during the implementation (e.g., supervisors). In addition, implementers were asked to complete a 25-item checklist\(^5\) to report on theoretical constructs addressed in the overall implementation of intervention activities within each intervention domain (Nutrition and PA).

**Data Coding and Analysis:**

The Intervention Analysis Procedure (IAP)\(^{32}\) was used to assess the degree of integration of ecological principles in the intervention program and to create a program “map”. The IAP is based on Richard and colleagues’ scheme to identify *intervention settings, targets, and strategies* as three key dimensions through which greater integration of an ecological approach can be operationalized in health promotion programming.\(^{17}\) Inspired from Miller,\(^{33}\) Richard and colleague’s\(^{17}\) scheme recognizes four types of intervention settings: organizational (ORG), defined as entities characterized by a formal hierarchy (e.g., schools, business); community (COM), defined as a group of persons and/or organizations in specific area (e.g., neighbourhoods,
parent associations); society (SOC) defined as a larger system that has control over those located in their constituencies (e.g., states); and supranational (SUPRA) defined as two or more societies (e.g., the European Union). The health promotion (HP) delivery agent may intervene in one or more of these settings.

Building on McLeroy’s work, Richard et al.’s scheme defines intervention targets as the intended beneficiaries of the HP intervention activities and identifies five possible targets: individuals (IND, e.g., children); the interpersonal environment (INT, e.g., people from one’s personal network who have influence over the IND); the organizational environment (ORG, e.g., school infrastructure and/or school personnel); the community environment (COM, e.g., community infrastructure and/or community members); and, the political environment (POL, e.g., policies or elected representatives). The “ultimate target” of an intervention is always individuals (IND) who can be engaged proximally by the HP (e.g., HP provides health information to the IND), or intermediately via other targets [(e.g., HP provides training to teachers (ORG) so that they can encourage healthy behaviours in children (IND)].

The intervention strategy represents the relationship that joins the targets intended for change with the intervention program. Multiple targets within a given strategy can be joined by either a direct transformation relationship, or by a networking relationship. A direct transformation relationship is denoted graphically by an arrow linking the HP to the ultimate target (e.g., HP → IND) or to its intermediaries (e.g., HP→ORG→IND). A networking relationship is when the HP brokers a new relationship between two or more entities in order to influence the ultimate target; it is graphically depicted by brackets surrounding the entities in the network (e.g., HP→[ORG-ORG]→IND). Network relationships can take the shape of different collaborative partnerships such as interagency alliances, community coalitions, informal cooperatives, and advocacy groups. These two types of relationships can be used in diverse combinations and might involve numerous targets before reaching the ultimate target. Table 1
shows examples of some of these intervention strategies by target; examples are drawn from the INSP program and complemented by examples from Gauvin and colleagues.16

We used the IAP17 to identify the intervention setting, targets, and strategies contained within the activity descriptions. Two separate coders, who were trained in the application of the IAP, coded the 25 activity descriptions with an initial concordance of 93% between them. Discrepancies in coding were discussed until consensus was reached.

The theoretical construct checklist5 was used to assess the degree of integration (i.e., presence/absence) of SCT theoretical constructs within each intervention domain. The 25 item-checklist includes six Self-Efficacy items (e.g., did activities integrate verbal motivation?); eight Reciprocal Determinism items (e.g., did activities aim to change existing practices or existing messages?); five Behavioural Capacity items (e.g., did activities aim to correct misconceptions?); and, six reinforcement items (e.g., did activities include incentives to participate?). Construct-specific items were grouped into four indices, and the within-index total was divided by the total number of index-specific items, yielding a construct-specific score.
<table>
<thead>
<tr>
<th>Target</th>
<th>Intervention Strategy</th>
<th>Description/Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>INDIVIDUAL</td>
<td>HP → IND</td>
<td>Interventions aimed at changing children directly</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g., Offering workshops for students on how to eat healthy &amp;</td>
</tr>
<tr>
<td></td>
<td>HP – (IND—IND)</td>
<td>Interventions aimed at linking up children to perform activities together</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g., Finding a partner for sports at recess &amp;</td>
</tr>
<tr>
<td>INTERPERSONAL</td>
<td>HP – INT – IND</td>
<td>Interventions aimed at changing children’s interpersonal environment (people who can</td>
</tr>
<tr>
<td></td>
<td></td>
<td>influence the IND, e.g., friends, parents, siblings)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g., Distributing booklets or newsletters to parents on how to pack a healthy lunch &amp;</td>
</tr>
<tr>
<td></td>
<td>HP – (INT—INT)—IND</td>
<td>Interventions aimed at linking up families/small groups to actually participate in</td>
</tr>
<tr>
<td></td>
<td></td>
<td>activities together</td>
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<td></td>
<td></td>
<td>E.g., healthy cooking group that meet to learn and cook healthy recipes</td>
</tr>
<tr>
<td>ORGANIZATIONAL</td>
<td>HP – ORG – IND</td>
<td>Interventions aimed at changing children’s organizational environment (school infrastructure and/or school personnel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g. Improving school premises to promote PA &amp;</td>
</tr>
<tr>
<td></td>
<td>HP—(ORG—ORG)—IND</td>
<td>Interventions aimed at linking organizations together</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g., Creating a partnership between two schools to buy sports equipment &amp;</td>
</tr>
<tr>
<td>COMMUNITY</td>
<td>HP – COM – IND</td>
<td>Interventions aimed at changing children’s community environment (community infrastructure and/or community members)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g. Improving parks to engage in PA after school &amp;</td>
</tr>
<tr>
<td></td>
<td>HP—(COM—COM)—IND</td>
<td>Interventions aimed at linking communities together</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g., Developing a partnership of two neighborhoods to clean the park to engage in PA &amp;</td>
</tr>
<tr>
<td>POLICY</td>
<td>HP—POL—IND</td>
<td>Interventions aimed at changing children’s political environment (policies or elected representatives)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g. Changing school policy to engage in PA during recess &amp;</td>
</tr>
<tr>
<td></td>
<td>HP—(POL—POL)—IND</td>
<td>Interventions aimed at creating alliances to promote more effective intergovernmental</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cooperation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E.g., Brokering an alliance between federal and local authorities for the delivery of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PE classes in schools &amp;</td>
</tr>
<tr>
<td>MIXED</td>
<td>HP—POL—ORG–IND</td>
<td>Interventions aimed at changing children through multiple targets E.g. Creating a</td>
</tr>
<tr>
<td></td>
<td></td>
<td>policy that teachers must attend training to deliver activation to students &amp;</td>
</tr>
</tbody>
</table>

HP=Health Promotion Delivery Agent, IND= Individuals, INT= Interpersonal environment, ORG=Organizational environment, COM=Community environment, POL=Political environment

& Examples drawn from the INSP school-based obesity prevention program; *Examples drawn from Gauvin, et al., 2001.
Data Analysis

Given the low frequency of some strategies within each domain (i.e., < 5), only descriptive statistics (percentages) were used to examine distinct intervention strategies and targets by domain. We used non-parametric analyses to describe the integration of SCT theoretical constructs between and within Nutrition and PA intervention domains. To determine differences in SCT construct use between domains, we used the Wilcoxon ranked test and to identify differences in SCT construct use within domains, we used the Friedman test (SPSS version 19 IBM, Chicago).

RESULTS

Ecological programming

The INSP school-based obesity prevention program implemented 32 distinct intervention strategies in schools during the 2007-2008 school year. All of the intervention strategies (i.e: 100%) occurred within a school setting (ORG) where the ultimate target, i.e., children, were reached.

The intervention program targeted the SEP (POL), schools/teachers (ORG), parents (INT), and children (IND). The intervention program only used direct transformation relationships, either by targeting the children proximally or by transforming the environment or actions of intermediaries of the children. Descriptive results displayed in Table 2, show that overall, four different types strategies were used, where 12.5% of the strategies targeted children (IND); 3% of the strategies targeted parents (INT); 47% of the intervention strategies targeted the school infrastructure and/or personnel (ORG); and 37.5% of the interventions targeted SEP (POL) with the aim of modifying the school infrastructure and/or personnel (ORG). Moreover, our results show that 69% of the intervention strategies were implemented within the Nutrition domain, whereas 31% of strategies were implemented within the PA domain.
Table 5.2 Frequencies of Intervention Strategies by Domain

<table>
<thead>
<tr>
<th>Intervention Strategies</th>
<th>Nutrition</th>
<th>Physical Activity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Intervention</td>
<td>N=32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IND</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>INT→IND</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ORG→IND</td>
<td>12</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>POL→ORG→IND</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>22</td>
<td>10</td>
<td>32</td>
</tr>
</tbody>
</table>

Use of Social Cognitive Theory constructs

Overall, results presented in Figure 1 show that the construct used most frequently within both intervention domains was Reciprocal Determinism (RD). However, within the Nutrition domain, Behavioural Capability (BC) was used to the same degree as RD, while Self-Efficacy (SE), and Reinforcement (R) were used less frequently, but equally. The pattern of construct use was different for the PA domain; in general, all of the constructs were used less often than they were within the Nutrition domain. However, none of the constructs in particular appear to have been favored; each being used approximately with the same frequency. The Wilcoxon test revealed no significant differences in SCT constructs (SE Z=-.586, p=.558; RD Z=-1.41, p=.254; R Z=-1.611, p=.107; BC Z= 1.81, p=0.70) use between the two domains and the Friedman test revealed no significant differences in the construct use within Nutrition ($X^2$ =6.35, p=0.096) and PA ($X^2$=6.94, p =0.074 ) domains.
Figure 5.1 Medians of SCT construct scores across domains

DISCUSSION

The aim of this paper was to assess the degree of integration of ecological principles and theoretical constructs involved in a successful school-based obesity prevention program in Mexico City. We sought to unpack the intervention program along intervention domains in order to develop a map of the successful intervention program. If we contrast our ecological map with recommendations in the literature,\textsuperscript{17, 18, 21} we can ascertain that this intervention program was a genuine ecological effort within a single setting since it delivered a diversity of intervention strategies involving multiple targets (POL, ORG, INT, IND), across both intervention domains. The ecological mapping showed that several different targets (PE teachers, school teachers, food vendors, parents, children and the school environment) were engaged, contrary to other “ecological interventions” that only target interpersonal influences,\textsuperscript{35} and that these efforts are congruent with those carried out around the world to promote behaviour change and to prevent obesity as recommended in the relevant literature.\textsuperscript{1, 3, 24, 36, 37}

Our findings indicate that the project was only implemented within the school (ORG) setting; this finding is not surprising given that this was a school-based intervention program. It
appears that different effort was invested in the implementation of intervention activities across the two domains. Within the Nutrition domain, more intervention strategies were delivered overall, relative to the PA domain. This finding is not unexpected given that when the project was implemented, the nutrition and PA contexts at schools were different\textsuperscript{9, 10} The nutrition environment was disadvantaged in relation to the PA environment; for instance, there were no nutritional guidelines to regulate eating practices at school whereas PE class, even if only offered once a week, was already in place as a regular practice.\textsuperscript{38} Thus, there was more potential for INSP staff to influence nutrition in schools (due to a lack of government guidelines) and they likely felt that nutritional intervention was more urgent. They were thus inclined to implement a comprehensive nutrition intervention strategy with a special emphasis on changing the school environment (ORG) since improvements needed to start from scratch.\textsuperscript{10, 11} We found that more than half of the strategies were focused on organizational change, while the rest were mainly aimed at influencing policy to impact schools. Given significant improvements in food availability at schools,\textsuperscript{30} it would appear that the use of a diversity of strategies at different ecological levels was effective.

Overall, we observed that, in relation to the intervention strategies implemented within the Nutrition domain, strategies implemented within the PA domain were fewer in number and less in diversity, with the majority of strategies concentrated on targeting the SEP (POL) as a way to improve PE and PA at schools. This finding is not surprising given that the improvement of PE and PA opportunities typically requires an injection of new resources (e.g., new equipment, additional PE teachers)\textsuperscript{39} whereas changes to the food environment do not necessarily require more resources per se, but instead, require an improvement of practices (e.g., replacing energy-dense foods with fresh fruits and vegetables\textsuperscript{4}). Furthermore, within the Mexican context, curriculum change is not within the mandate of schools, but rather belongs to the state. Thus, the main way in which PE can be impacted in a sustainable manner at schools is through policy change at the state level (SEP). Given that, during the 2007-2008 year period, the proportion of
students taking more steps (according to pedometer counts) increased in the intervention schools as compared to comparison schools (p=.06). It would seem that strategies to engage policy decision-makers to influence school PA opportunities may be particularly warranted in Mexico.

Overall, our findings are consistent with existing evidence that policy intervention strategies can impact different ecological levels of influence. This may be especially the case for hierarchical institutions such as school systems, where decisions are made at more than one level.

Finally, another notable finding from the current study is that only one intervention activity was implemented to engage parents in the support of healthy lifestyles for their children. Given growing evidence that family support is essential to the success of school-based health promotion activities, this would appear to be a shortcoming of the INSP program. It may be speculated that the inclusion of additional interventions to engage families in obesity prevention efforts instigated by the school might have resulted in a larger impact in child PA and nutrition behaviour change. Future research should investigate the feasibility of engaging families to support school-based health promotion efforts in Mexico.

An analysis of SCT behavioural constructs showed no statistical differences in their use within and between intervention domains. However, some tendencies and variations were observed. The theoretical construct most often used by intervention staff to influence the different ecological levels was reciprocal determinism (RD), also referred as the environmental construct. Given that the aim of the intervention program was to improve the environment, the frequent use of this construct is not surprising. Intervention activities flowing from the RD construct intended to influence existing attitudes about the school food and PA environment, related policies, practices, and services. For instance, HP workers supported the improvement of the food environment by influencing the reduction of the sale of sweets during recess and by facilitating conditions for water consumption by organizing potable water deliveries to schools. Moreover, HP workers improved the PA environment by modeling the use of the
schoolyard by organizing structured games during recess. The use of the RD construct to influence the food and PA environment is a common practice that has been documented in other intervention projects targeted to children.\textsuperscript{43}

Patterns of use of other SCT constructs appeared to vary slightly, although not significantly, across and within domains. Within the Nutrition domain, BC was used as frequently as RD. In the Nutrition domain, the BC construct was used to influence food and nutrition knowledge and to model skills during the workshops that individuals need to carry out healthy eating behaviours. In addition to verbal information provided to intervention targets, HP workers used BC-oriented print materials to engage food vendors, key authorities and children to correct misconceptions about healthy eating and to provide new options for improving school food related practices. The frequent use of RD within the Nutrition domain was likely related to program aims to influence food availability at schools. The high use of these two constructs in the nutrition domain is congruent with the INSP outcome results that show significant improvements in the food environment and enhanced healthy food intake by children in intervention schools.\textsuperscript{30} These results are consistent with other studies that have effectively used these constructs to improve food intake practices in children.\textsuperscript{43-45}

Within the PA domain, the use of SCT constructs appeared more balanced. This may be because PE sessions were already occurring in schools on a regular basis and were being delivered by professionally trained experts (i.e., PE specialists). Thus, the implementation of activities within the PA domain may have required less guidance by INSP staff as compared to activities within the Nutrition domain which required that food vendors responsible for food availability at school be provided with guidance and information to learn new practices about how to create a healthy food environment. This finding is comparable to other research showing less use of theoretical constructs in the implementation of PA in interventions in children in relation to other domains and other populations.\textsuperscript{46}
Overall, SCT behavioural constructs were used less frequently in the PA domain in relation to the Nutrition domain. This finding is congruent with our ecological mapping showing that the majority of PA intervention strategies were targeted to SEP (POL) and aimed to modify the political environment rather than to change the behaviours of individuals (e.g., students and school staff). It may be that constructs from theories other than SCT (e.g., relevant to the policy process) are used to influence policy.

Our findings provide new insight into a promising combination of strategies and theoretical constructs that can be used to implement an ecologically founded school-based obesity prevention program. A limitation of this study was our inability to gauge the magnitude of effort devoted to various intervention activities. The IAP does not allow for the assessment of the “dose” of each intervention. Thus, the development and implementation of educational materials to enhance healthy eating might have been captured as one intervention activity (and coded as a single strategy), when in fact these same materials might have been used daily by teachers. In addition, the checklist used to assess SCT construct use only captured four of the then SCT constructs; a more exhaustive list may have yielded a different theoretical picture.

CONCLUSIONS

To our knowledge, this is the first research to document the degree of integration of ecological principles and theoretical constructs in a school-based obesity prevention program in Mexico. The deconstruction of a successful intervention program that has documented environmental and student behaviour improvements provides novel information for the implementation of multifactorial interventions in school-based health promotion programs. Although there may be a variety of successful combinations of ecological strategies and theoretical constructs, our findings provide one version that can be used as a starting point to develop even more effective combinations. In a context where the school environment is considered “obesogenic” and there is compelling evidence that this environment can shape
children's eating and PA patterns \textsuperscript{47, 48}, the current findings provide valuable insight about the types of strategies that can be leveraged to optimal effects. It is expected that these findings will be especially meaningful to inform obesity prevention programs in Mexico and in low-middle income countries where childhood obesity is an emerging problem.
REFERENCES


CHAPTER 6: MANUSCRIPT 4

Quality and Implementation Assessment of the Mexican National Nutrition and Physical Activity School Policy Guidelines

Margarita Safdie PhDc, and Lucie Lévesque PhD.

Acknowledgements

The authors are grateful to all the researchers and health promotion practitioners from the INSP who collected the data. The authors would like to thank Lizbeth Tolentino for her assistance in the data collection and cleaning.
ABSTRACT

Introduction: The WHO School Policy Framework (SPF) was designed as a guideline to implement the Global Strategy on Diet, Physical Activity and Health.\(^1,2\) In 2009, the Mexican Ministry of Health (MOH) developed the Mexican National Strategy for Overweight and Obesity Prevention\(^3,4\) following the model proposed by the WHO Diet and Physical Activity Strategy (DPAS). The National Strategy includes school-specific recommendations and regulations related to Physical Activity (PA), healthy eating, through the sale and distribution of food inside schools (ANSA).\(^5\) **Objective:** The purpose of this study was to document the quality, implementation conditions and overall implementation of the ANSA School Guidelines in 20 Mexico City schools. **Methods:** An inventory of the 10 preconditions to perfect implementation was carried out in order to assess the quality of the ANSA School Guidelines policy. Key informants provided information on policy implementation during the 2011-2012 school year in response to a structured interview. **Results:** Not all of the ten implementation pre-conditions were met; some ambiguity in the ANSA School Guidelines content, particularly surrounding funding allocation, training, and task enforcement were identified. Although the ANSA School Guidelines mostly complied with WHO international recommendations according to the WHO School Policy Framework, the ANSA School Guidelines were not fully implemented within our sample. **Conclusions:** This analysis highlights areas for improvement in the ANSA School Guidelines policy. Findings from this research suggest that the early implementation of the ANSA School Guidelines is promising for the institutionalization of new actions within the Mexican school system.

**Key words:** Policy implementation, School based policy, Dietary guidelines in Mexico, Childhood obesity, Policy assessment
INTRODUCTION

Mexico is experiencing an accelerated nutritional transition in which a shift is occurring from a high prevalence of malnutrition to a predominance of non-communicable chronic diseases (NCCD) and obesity. These epidemiological shifts are attributed to changes in lifestyle patterns resulting from the rapid process of urbanization, economic growth, and technological innovations. These changes have led to the development of an “obesogenic” environment that translates into less frequent physical activity opportunities, increased availability of energy-dense products, and reduced availability of fresh produce. Consequently, overweight and obesity in children have increased alarmingly in all age groups in the last decade. Results from the latest national survey in 2012 showed that the combined prevalence of overweight and obesity in school-age children was 34.4% according to WHO growth references.

Childhood overweight carries numerous short and long-term health risks that include physiological and psychological complications. Children who are overweight or obese today experience obesity-related risks for a longer period of their lifetime compared to previous generations, which may increase the risk of dying by middle age. The childhood obesity epidemic in Mexico requires immediate action to promote healthy living opportunities and guide obesity prevention efforts. Policies, which may include formal and informal rules, laws, and regulations, are a primary mechanism for making environmental changes.

Policy interventions move beyond individually targeted interventions to effect possible change within the larger population. Evidence shows that policies can be an effective way to reach multiple segments of the population and can offer a comprehensive response to the emerging public health challenge of diet and physical activity related NCCD and obesity. Policies that modify the environment and enhance healthy lifestyle opportunities are fundamental to support interventions that promote healthy choices. Therefore policy interventions to address rising obesity trends are widely recommended by researchers and the WHO.
because they can provide “guidance for collective and individual behaviour”\textsuperscript{17, 18, 24, 27} at a relatively low cost.\textsuperscript{28}

Schools have been identified as a natural setting for implementing nutrition and physical activity policies to tackle childhood obesity.\textsuperscript{1, 24, 29} School policy often focuses on changing the school environment to improve opportunities for healthier practices for students.\textsuperscript{30, 31} Examples of environmental school policies include nutrition policies to enhance the availability of healthy food in schools;\textsuperscript{31} and PA policies to change the physical environment or practices within the school.\textsuperscript{31} These policies have the potential to impact students' food choices\textsuperscript{24, 30, 31} and PA practices\textsuperscript{32} and might be the first step to prevent obesity.\textsuperscript{24, 33-35}

In Mexico\textsuperscript{36-38}, as in other parts of the world such as United States of America\textsuperscript{39} or Canada,\textsuperscript{40} the default conditions in school environments typically promote unhealthy eating and physical inactivity. Data from an RCT trial carried out in Mexico from 2006-2008,\textsuperscript{36, 37} showed low availability of fruits and vegetables, high availability of energy-dense foods, low quality of PE classes, and limited access to PA-conducive environments in elementary schools.\textsuperscript{41} The researchers concluded that a major contributing factor to the obesogenic school environment in Mexico was the lack of a comprehensive school policy to regulate the food and PA environment.\textsuperscript{38}

In response to the obesity crisis in Mexico, and in line with the Global Strategy on Diet, Physical Activity and Health (DPAS) endorsed by the World Health Assembly,\textsuperscript{1, 2} in 2009, the National Strategy for the Prevention of Overweight, Obesity and NCCD was developed by the Secretaria de Educación Publica (Secretary of Public Education, SEP) and the Secretaria de Salud (SA-Secretary of Health) with participation of nutrition and health scientists and the food industry.\textsuperscript{3, 4} This strategy contains specific regulations to be implemented within the school setting. The “Mexican National Guidelines for Healthy Eating in Schools” (referred hereafter as School Guidelines) consists of a set of guidelines and regulations related to PA, healthy eating, and the sale and distribution of foods inside schools.\textsuperscript{5}
Experiences from the assessment of school wellness policies in the US and Canada have shown mixed results in terms of policy implementation, compliance, and impact\textsuperscript{11}. School policy research in the US has shown that policies in which the federal government imposed mandates on schools with no supportive training were generally seen as politically infeasible.\textsuperscript{24, 39} Other obstacles to school policy implementation include disputes over policy interpretation,\textsuperscript{42} lack of resources and time by those charged with implementing policy,\textsuperscript{43} high staff turnover, teacher lack of knowledge about healthy lifestyle practices, competing curricular commitments, and lack of continuity between school and family practices.\textsuperscript{34, 44}

According to Hogwood and Gunn\textsuperscript{45} there are two potential causes to explain why a policy may have poor uptake and impact; in their words, a policy is either “badly executed” or simply a “bad policy”. A badly executed policy is when a policy is implemented ineffectively due to administrative obstacles, uncooperative actors, resistance, etc., whereas a bad policy is a policy that is based upon inadequate information, defective reasoning, lack of implementations conditions, lack of resources or unrealistic assumptions.\textsuperscript{45} Both dimensions, policy implementation and policy quality, should be assessed before policy impact can be measured and understood. This type of assessment can be used to identify challenges and/or enabling factors of policy uptake;\textsuperscript{45} increase the understanding of the policy process and its outcomes;\textsuperscript{17, 40} and inform decision making about the policy (e.g., expand or terminate).\textsuperscript{29, 45}

Several researchers have proposed useful ways to assess a policy’s potential for implementation.\textsuperscript{17, 28, 45} Hogwood and Gunn proposed a framework with 10 preconditions essential for successful policy implementation, arguing that a successful implementation may improve the effectiveness of a policy.\textsuperscript{45} This framework uses a prescriptive approach to analyze implementation conditions and provide reasons to policy implementers about why the implementation is not occurring.\textsuperscript{45} This policy framework has been used successfully to analyze provincial policy documents related to school PA policy in Ontario, Canada.\textsuperscript{46}

Given that the effectiveness of the School Guidelines will depend on both their potential
for impact (i.e., policy quality), and on the extent of their implementation, the assessment of implementation preconditions of the School Guidelines and the assessment of their actual implementation in schools, represent natural first steps in assessing overall ANSA School Guidelines policy impact.

The purpose of this study was: 1) to assess School Guideline quality and likelihood of implementation through an examination of preconditions for perfect implementation according to the policy analysis framework proposed by Hogwood and Gunn and, 2) to document the implementation of the School Guidelines in schools of Mexico City through an examination of the School Context Action Plan (Programa de Accion en el Contexto Escolar) process indicators and WHO School Policy Framework indicators.

METHODS

The General Research Ethics Board of Queens University and the Research, Ethics and Biosecurity Commission of the Mexican National Institute of Public Health (INSP) reviewed and approved the study protocol. The research was carried out over the 2011-12 school year.

Study Context

The School Guidelines and the School Context Action Plan were designed by the SEP and SA federal authorities from President Calderon administration and were introduced in all schools in Mexico according to a gradual implementation plan started in 2010. The implementation plan was designed with the involvement of industry (at a transnational level) to allow industry to transition and meet new nutritional and portion size food packaging requirements. Implementation of the School Guidelines was expected to improve the school environment, opportunities, and conditions for physical activity and healthy eating. The data collection was carried out in the spring of 2012 after the School Guidelines had been implemented for two years (approximately 75% of the implementation completed).
Schools

Of 274 schools located in the south of Mexico City, 47 met the inclusion criteria and 20 schools agreed to participate. Details of the inclusion criteria and recruitment protocol are published elsewhere.

Policy documents

All school guideline official documents, published and unpublished, were collected for review. These included The National Strategy for Overweight and Obesity Prevention and School Guidelines background document; the School Context Action Program; the Physical Activation Manual Developed for PE Elementary Teachers; the Food Management Procedure Manual for School Principals and Teachers; the Food Preparation Manual and Guidelines for School Food Vendors; the Guidelines for the School Participation Council published in the official gazette of the federation; and the Parents’ and Family Healthy Eating Guidelines.

Key Informants

Three school key informants (the school principal, one PE teacher, one canteen committee member) from each of the 20 schools were recruited to respond to questions pertaining to their position within the school. For instance, the PE teachers responded to PE and PA related questions, canteen members responded to food related questions, and principals responded to questions about overall school services and environment.

Measures and Procedures

Implementation preconditions

The 10 implementation preconditions for “perfect implementation” according to Hogwood and Gunn are presented in Table 6.1. These preconditions are related to the quality of the policy and the ideal conditions that needed to be present in order for a policy to be successfully implemented. Some of the quality indicators include theoretical indicators such as being theory-based and a direct relationship between cause and effect. Some of the policy implementation pre-conditions include organization elements such as lack of external barriers,
provision of adequate resources, lack of dependency, as well as strong coordination and communication.
<table>
<thead>
<tr>
<th>Precondition</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Circumstances external to the implementing agency do not impose crippling constraints</td>
<td>Evidence that external obstacles (physical or political) to the implementation (outside the control of the administrators) were taken into consideration during the policy making stage.</td>
</tr>
<tr>
<td>2. Adequate time and sufficient resources are made available to the program</td>
<td>Evidence that timelines and resources (funding, process development, supportive mechanisms, and training) allow for completion of all of the required steps and activities for the policy to be implemented as per the implementation plan.</td>
</tr>
<tr>
<td>3. Required combination of resources is actually available</td>
<td>Evidence that the appropriate combination of resources needed for the completion of all of the required steps and activities for the policy to be implemented as per the implementation plan is available.</td>
</tr>
<tr>
<td>4. Policy to be implemented is based upon a valid theory of cause and effect</td>
<td>Cause and effect evidence to support the policy is cited in policy documents.</td>
</tr>
<tr>
<td>5. Relationship between cause and effect is direct and that there are few if any, intervening links</td>
<td>Direct cause and effect evidence between the policy and anticipated outcomes is cited in relevant published literature.</td>
</tr>
<tr>
<td>6. Dependency relationships are minimal</td>
<td>Evidence of a single lead implementation agency with the authority to complete the required steps and activities for the policy to be implemented as planned with minimal involvement (in number and importance) required by other agencies.</td>
</tr>
<tr>
<td>7. There is understanding of, and agreement on, objectives</td>
<td>Policy documents include feedback from stakeholders that objectives are understood and supported.</td>
</tr>
<tr>
<td>8. Tasks are fully specified in correct sequence</td>
<td>Description of tasks in the policy documents are sufficiently detailed to carry out the implementation plan.</td>
</tr>
<tr>
<td>9. There is perfect communication and coordination</td>
<td>Evidence (historical and/or current) that stakeholders can communicate and coordinate their activities successfully.</td>
</tr>
<tr>
<td>10. Those in authority can demand and obtain perfect compliance</td>
<td>Implementing agency has authority over the people and entities from who consent and cooperation are required for successful policy implementation.</td>
</tr>
</tbody>
</table>
**Policy implementation indicators**

A comprehensive close-ended questionnaire including 23 policy indicators derived from the WHO-DPAS SPF and four School Context Action Program-specific policy indicators was developed according to expert feedback. The 23 WHO-DPAS SPF policy indicators deemed most relevant to the Mexican context included two *School recognition* items (e.g., existence of criteria for awarding schools for their efforts to promote healthy eating and physical activity); five *Health and Physical Education curriculum* items (e.g., existence of curriculum standards for health and physical education); six *Food services environment* items (e.g., schools providing children with food that are consistent with national standards); six *Physical environment* items (e.g., availability of school food services); one *Health Promotion* for school staff item (i.e., training for school personnel), and three *School health services* items (e.g., existence of a height and weight monitoring system). Some of the WHO SPF indicators were not included as they were not deemed relevant to the culture (i.e., availability of vending machines at schools), normative environment or to the Mexican public school system. For example, the SPF indicator of ‘agreement with local governments to share community recreation facilities with schools during school hours’ is not relevant because of the rarity of community recreation facilities in most of Mexico. Although some of the excluded indicators might apply to private schools in Mexico, our focus is limited to the public school system. The four School Context Action Program indicators consisted of the operative conditions to implement the School Guidelines such as the formation of a school committee. Respondents were asked to report on the presence/absence of each indicator.

**Procedures**

In order to assess policy quality, the first author, who is a native Spanish speaker, read and coded all of the collected documents to identify the presence/absence of each of the 10 implementation preconditions. Table 1 shows the 10 preconditions for “perfect implementation” according to Hogwood and Gunn.45
In order to gauge policy implementation, key informants responded to the 27-item policy indicator questionnaire in the spring of 2012. Trained interviewers visited the schools during school hours and spoke to each of the three informants (i.e., principal, PE teacher, canteen committee member) for about 10 to 15 minutes each.

RESULTS

Policy Quality and Implementation Preconditions. An examination of preconditions for implementation according to a policy analysis framework proposed by Hogwood and Gunn was used to assess policy quality and implementation preconditions. Results are presented for each of the preconditions.45

Precondition 1: “The circumstances external to the implementing agency do not impose crippling constraints”

According to the School Guidelines the implementation Agency is the SEP and all the authorities and schools. The School Guidelines agreement was signed by the SEP, SA, and the Food Industry on January 2010 and published in the Diary Gazette of the Federation in August 2010 (referred hereafter as the official policy document). In order to provide legal autonomy to the policy and to remove any external bylaw obstacles that interfere with the implementation, the guidelines design was mainly founded on several Education and Health laws and bylaws. In addition, this policy also modified some secondary segments of the General Health Law, the Education Law, and the Child Protection Law. Additionally, the School Guidelines policy has updated the SEP internal operative regulations and mandates the changes in the Sanitary Control of products available in school canteens, assuring total congruency with the School Guidelines implementation. The publication of the School Guidelines in the Gazette of the Federation is a juristic instrument that repeals any potential obstacle interfering with policy implementation. Thus, it appears that external circumstances do not impose crippling constraints to the School Guidelines implementation. The Guidelines official policy document makes no mention of
efforts to address any other external obstacles, such as political changes or military actions that might impede its implementation.

**Precondition 2: “That adequate time and sufficient resources are made available to the programme”**

Hogwood and Gunn\(^4\) maintain that adequate time and sufficient resources (e.g., funding, process development, supportive mechanisms, and training) are required to avoid obstacles and disruptions in the implementation process. Hogwood and Gunn\(^4\) explain that policy makers do not always accurately account for the ongoing resources needed by planners/implementers and may not foresee the process development needing to occur in order to implement the policy. Therefore, for the purpose of this analysis, the processes and actions taken to support the implementation of the School Guidelines are considered to be resources.

The policy documents reviewed\(^3, 5, 48, 52, 54\) do not explicitly mention any allocation of funding to implement the policy. Administrative resources are mentioned only in the official policy document\(^5\) in which the SEP requires that health and education authorities from states outside of Mexico City comply with policy standards. Specifically, the official document requires each state to coordinate efforts with the SA federally to identify resources, initialize process development and identify regulatory actions to implement the policy. Thus, it appears that resources for implementation are limited and at the discretion of the interests of the Health and Education authorities of the states, making it seem unlikely that funding will be sufficient to adequately implement the policy.

One of the highlights of the School Guidelines is that it is an agreement signed by the food industry, which sets a precedent in the prevention of childhood obesity. In line with this agreement is that the School Guidelines food policy will be implemented gradually to allow the food and beverage industries to improve the food quality offered to the schools and thus comply with the nutritional guidelines.\(^3, 5\) There are consumer reports showing that the food industry has
reformulated food options available according to the scheduled agreement, however these products only partially meet the nutrition criteria.55

**Precondition 3: “That the required combination of resources is actually available”**

The official policy documents 48,49,51-53 clearly describe actions to be taken in schools through the School Context Action Program 48 in order to implement the policy at schools. These actions include: 1) the updating of guidelines to regulate the availability, sale and preparation of food at schools according to evidence-based nutritional standards; 2) the call for the reformulation of industrial foods in order to meet these nutritional guidelines; 3) the provision of drinking water at schools; 4) the provision and promotion of physical activity in schools; and 5) the promotion of healthy lifestyles (promotion of PA and healthy eating) in the school community. Among the main strategies of the policy to implement these action items is to strengthen and provide legal autonomy to the School Council for Social Participation 5,52 (Consejo Escolar de Participacion Social). Some of the responsibilities of this Council are: ensuring conformity of standards among the canteen committee inside schools, monitoring food availability, promoting physical activity, and addressing the controversies that may arise regarding the availability/management of food in schools.

The official policy document instructs the SA to design a strategy to educate school community stakeholders so that they understand and apply the updated nutritional guidelines.5 This SA strategy is aimed at improving knowledge about healthy feeding, food selection and food preparation in school canteens. For this purpose, the SEP and SA developed orientation materials (booklets) aimed at addressing healthy eating targeted to school principals, class teachers,50 and parents53; food preparation targeted to school vendors51 and the canteen committee;50 as well as, promotion of PA at schools targeted to PE teachers.49 Additionally, the SEP will design educational materials and training workshops about the health effects of sugary beverage consumption, artificial sweeteners, and fat and sodium in the diet in order to guide healthy intake among school stakeholders and children. While these materials provide health education
information, the policy documents provide no detailed information about funding allocation, formal training or capacity building targeted to schools or stakeholders for the purposes of applying the guidelines.  

**Precondition 4:** That the policy to be implemented is based upon a valid theory of cause and effect” and **Precondition 5:** “That the relationship between cause and effect is direct and that there are few if any, intervening links”  

Hogwood and Gunn\(^4^5\) argue that if a policy is based on a valid theory of cause and effect, the likelihood of successful implementation and policy impact will increase. The assessment of the use of theory can help determine if the outcomes are related to poor implementation or to inappropriate theory.  

The official policy document was based on the negative environmental and epidemiological changes in Mexico in the last 20 years\(^5\) and the high childhood obesity prevalence. The School Guidelines represent the response of the federal government to address and reduce the prevalence of childhood obesity. They are multifactorial, multilevel, intersectoral (private and social), evidence-based and are aimed to improve the food and PA school environment, as well as the health and academic achievement of children.\(^5\) The theoretical elements underpinning the School Guidelines and the School Context Action Program\(^4^8\) are congruent with the literature that calls for comprehensive policies to improve the environmental conditions in school to thereby preventing childhood obesity\(^2^2, 2^4, 2^7, 2^9, 3^1, 3^5\). Thus, the formulation of the ANSA School Guidelines demonstrates an understanding of problems requiring solutions rooted in evidence-based theory associated with obesity prevention.  

For precondition 5, the assessment of the policy cause and effect relationship is useful to determine whether or not there are any intervening links that might affect the relationship hypothesized, and would therefore interfere with the implementation. The improvement of the school environment has been shown to be effective in the formation of healthy lifestyles and in the long run, potentially effective in obesity prevention in school-age children.\(^2^2, 2^4, 3^0, 3^1, 3^5, 5^6\)
However, given that effects are typically mediated through behaviours such as eating and physical activity, the cause and effect relationship between the policy and obesity can be considered to be indirect. Moreover, children are exposed to other obesogenic environments (such as home and community) that might also indirectly challenge obesity prevention in children. Therefore precondition 5 is not met, since according to Hogwood and Gunn, there should not be any intervening links beyond the natural implementation challenges inherent in applying the policy.

Precondition 6: “That dependency relationships are minimal”

Hogwood and Gunn suggest that for better policy implementation it is necessary to reduce dependency relations between agencies and that a single implementing agency model is desirable. The analysis of the official policy document showed that there is mainly one agency, SEP, which is directly responsible for implementation of the School Guidelines. However, there are other factors that depend on the SA (e.g., training of stakeholders), and this implies that SA will be indirectly involved in the policy implementation. Due to this connection, there is a certain degree of dependency between the two agencies. More information is needed to determine if the flow of information and resources reach the schools and how the implementation will be affected by the different organizational levels (local, municipal, district, state) in SEP and SA.

Precondition 7: “That there is understanding of, and agreement on, objectives”

The objectives of the School Guidelines are clearly stipulated in the official policy document. The objectives section defines objectives at the federal level and has a glossary of terms where key terms are defined. This document also includes the principles of healthy eating at school and how to promote these principles in schools. It also describes how to create a culture of healthy eating habits and the responsibilities of the canteen committee. Furthermore, it includes the hygienic practices that should be followed by the food vendors and the expected physical conditions of the place where the food is prepared.
The official School Guidelines document and the School Context Action Program describe the obligations and responsibilities of the School Council for Social Participation, canteen committees, the education stakeholders (principals, supervisors and class teachers), parents, and children. However, there is no concrete description of task management/implementation such as when, what, and how the policy will be implemented. Overall, the description of these objectives is very comprehensive, but broad and lacking in specificity.

Finally, the official policy document contains a unique annex where the objectives of the nutritional guidelines and the foods permitted are specified in detail. However, given that there is no definition of concrete training in nutrition and that the current analysis does not include first person accounts about the policy, it is unknown whether these high-level technical objectives are going to be understood by stakeholders.

**Precondition 8: “That tasks are fully specified in correct sequence”**

The official School Guidelines document and the School Context Action Program define the role of each stakeholder and describe how to change food availability at schools and how to improve PA in a congruent sequence. The annex included in the official policy document outlines the nutritional specifications and the sequence in which changes to food and beverages in schools are to be implemented. The ANSA school guidelines has a three-year implementation plan to reach its nutrition goals. However the achievement of PA goals is not described in the implementation plan. Nevertheless, there is a supportive document developed by the SEP, which describes the PA promotion (i.e., improvement of the quality of PE classes, promotion of active recess, and PA during free time) in schools aimed at PE teachers and trained class teachers. Overall, the key tasks to be carried out are detailed in the official policy document; whether or not these tasks are going to flow in the proper order is hard to ascertain from the policy documents. Moreover, whether the stakeholders are trained for solving arising problems is also uncertain from the available information.
Precondition 9: “That there is perfect communication and coordination” and

Precondition 10: “That those in authority can demand and obtain perfect compliance”

Hogwood and Gunn assert that perfect communication and coordination are unattainable in the real world given that “organizations are characterized by departmentalism, professionalism, and the activities with many groups with their own values and goals to protect”. The official School Guidelines document and the School Context Action Program call for coordination within and between SEP, SA, school communities, stakeholders, and among all states. In theory, the SEP is in charge of Education at the Federal level and is the agency that mandates and delivers actions/changes at schools. Moreover, the SEP has the power to coordinate the actions at provincial, district, community and local level. Therefore it is expected that SEP can coordinate the actions of key stakeholders and thereby implement the policy perfectly.

For precondition 10, Hogwood and Gunn acknowledge that there is no perfect compliance in the real world. However, this precondition implies that the SEP is able to mobilize stakeholders to comply with the policy requirements, and has the power to mandate the policy implementation with no major opposition. In theory, the schools, teachers, food vendors and stakeholders should be implementing the SEP policy to promote healthy environments in schools because their staff is legally obligated to comply with mandates from their federal employer. However, in practice, the School Guidelines may not be implemented if there is no accountability.

Policy Implementation

The 27-item indicator questionnaire was completed by school key informants at the end of the second year of implementation in 20 schools of Mexico City. The results of the indicators are grouped in six different sections. Overall, the results showed that the policy was partially
implemented even though the operative conditions for implementation were mostly met. For instance, the majority of the schools met the conditions needed to implement the School Context Action Program such as existence of school council for social participation and active of school canteen committee. However, the number of schools complying with the food and beverage School Guidelines was really limited given that few schools provided children with food and beverages consistent with the national standards. Moreover, the PA promotion at school was carried out in less than 50% of the schools.

In terms of changes in school curriculum, the number of schools reporting improvement was very high and all of the schools acknowledged it implying that all the schools in our sample were following through on mandated changes to the PE and nutrition curriculum. In contrast, indicators regarding a recognition system (a mechanism to provide schools with incentives to stimulate policy implementation\(^{39}\)), seemed to be unused by the school authorities despite being mentioned in the School Context Action Program.\(^{48}\)

Findings regarding food services and the physical environment were mixed; although the majority of the schools were providing school breakfast programs, monitoring the marketing of foods, sometimes promoting active recess, and safe PA areas, the majority of the schools were not complying with the active recess requirements stipulated by the School Guidelines. Moreover, few schools had cycling and walking programs to schools.

Table 6.2 shows the number of schools in which each of the policy indicators was reported to be present in the spring of 2012.
Table 6.2. Number and percentage of schools in which the policy indicators were reported to be present

<table>
<thead>
<tr>
<th><strong>School Context Action Program operative indicators</strong></th>
<th>N/20</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existence of School Council for Social Participation</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Existence of canteen committee</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Schools with canteen committee meeting once a month</td>
<td>14</td>
<td>70</td>
</tr>
<tr>
<td>Schools with Physical Activation</td>
<td>16</td>
<td>80</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>School Recognition</strong></th>
<th>N/20</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of criteria and procedure for awarding schools</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Number of schools awarded</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>School Curriculum</strong></th>
<th>N/20</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools with curriculum standards for health education</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Schools with curriculum standards for physical education</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Schools meeting standards for physical education</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Schools with qualified physical education teachers</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Schools with physical education classes cancelled</td>
<td>11</td>
<td>55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Health promotion for school staff</strong></th>
<th>N/20</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools where teachers received education on healthy lifestyles</td>
<td>9</td>
<td>45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>School health services</strong></th>
<th>N/20</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools monitoring children's height and weight</td>
<td>19</td>
<td>95</td>
</tr>
<tr>
<td>Schools that use feedback system to report height and weight</td>
<td>13</td>
<td>65</td>
</tr>
<tr>
<td>Students that seek advice on healthy eating and physical activity</td>
<td>14</td>
<td>70</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Food services environment</strong></th>
<th>N/20</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools offering school breakfast programmes</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Existence of published nutritional standards for school foods and beverages</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Schools with adequate period of time for eating lunch at recess</td>
<td>17</td>
<td>85</td>
</tr>
<tr>
<td>Schools restricting marketing and advertising of energy-dense foods and beverages</td>
<td>13</td>
<td>65</td>
</tr>
<tr>
<td>Schools providing children with beverages consistent with national standards for school beverages</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Schools providing children with food and consistent with national standards for school food</td>
<td>3</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Physical environment</strong></th>
<th>N/20</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schools with a safe playground, play equipment</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>Children that stay inside during recess time</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Schools with daily active recess for all students</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>Schools with safe &quot;walk/cycling-to-school&quot; routes</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>School with programme to promote walking and cycling to and from school</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Students actually participating in physically-active extracurricular activities</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
DISCUSSION

The aim of this study was to assess the quality and implementation preconditions of the ANSA School Guidelines and the success of their implementation during the second year of implementation. The ANSA regulations and School Guidelines were approved and mandated by health and education authorities from the 32 Mexican States and the Federal District by consensus in a meeting that took place in July 2010.\textsuperscript{54} Adopting the School Guidelines mandate, may not be enough to comply with policy implementation however. Policy implementation research suggests that despite government calls for coordination/communication and claims for control over the policy, if the policy quality is poor or the implementation preconditions are not met (i.e., undefined task allocation, lack of clarity of responsibilities and competencies) the policy implementation may be compromised or at risk.\textsuperscript{57} The lack of communication and coordination between agencies (SEP and SA) was also observed in our 20 school findings. In almost all schools, children’s height and weight were monitored. This suggests the presence of a good screening system to identify high risk obesity in children. However, the fact that half of the schools did not provide feedback to parents and children might jeopardize the opportunity to prevent new cases of obesity. A potential explanation for the lack of a feedback system is that the information between the health authorities in charge of the screening and the education authorities in schools is not flowing. A lack of communication and coordination between SA and SEP might hinder the implementation of the School Guidelines as suggested by Hogwood and Gunn.\textsuperscript{45, 46}

An examination of the preconditions revealed that in general, there is good political will from the government toward the prevention of childhood obesity, but the implementation preconditions were not conducive and optimal for successful implementation. However, our analysis of the policy showed a lack of funding allocation and training and ambiguously described objectives. Moreover, the implementation indicators showed that the Guidelines were not being adequately implemented at the selected schools. Our assessment of the quality of the
Guidelines revealed that funding allocation is only vaguely described and allows for varying interpretations. The existing literature has shown that an insufficient amount of funds is a challenge to policy implementation.\textsuperscript{19, 45, 58, 59} This, in turn, may compromise the implementation by creating resistance and a lack of commitment towards the policy, as has been observed in similar policy processes.\textsuperscript{58}

Research suggests that governments have an important role in providing training and resources to the stakeholders responsible for policy implementation.\textsuperscript{1, 29, 58} Our School Guidelines quality analysis revealed little information about any training strategies and there was no specific mention of how the Guidelines might be understood and implemented by those tasked with implementation. This finding is congruent with our implementation results that showed that even though all of the schools had received the “resources” (written food and beverages guidelines and supportive materials) and had formed two important committees (the School Council for Social Participation and the School Canteen Committee) to oversee the implementation of the policy at all schools, as mandated by the ANSA School Guidelines, less than half of participating school representatives reported receiving health promotion education training. Moreover, our quality analysis showed that some of the objectives had technical descriptions that could lead to misinterpretations. Research has shown that adequate and relevant training is essential for a policy to succeed because increased awareness reduces the perception that a policy has been imposed.\textsuperscript{58}

The majority of the schools reported that they were not complying with the food and beverage standards outlined by the School Guidelines. A potential explanation for this finding might be that school authorities are not fully capable of applying the nutrition requirements, especially to the street vendors’ home-made preparations for sale at recess. Given that this food is not industrialized and is not prepared at schools, it is probable that the school authorities are unclear as to how to interpret and comply with the nutritional guidelines. The lack of understanding—or the misinterpretation of the policy—has been reported as a barrier to
compliance with school policies. The school stakeholders, the School Council for Social Participation and the Canteen committee’s lack of comprehensive training on the School Guidelines might also explain the poor compliance.

Another important finding relates to the ambiguity about the execution of the PA component (including the PE classes) at the schools. The quality analysis showed that the School Guidelines do not specify the PA implementation plan and related tasks to achieve the objective of the provision and promotion of physical activity in schools. Moreover, the implementation findings suggest that there remains room for improvement in terms of the cancellation of PE classes, which seems to occur in about half of the schools. The PE class cancellation is a recurrent practice in the Mexican school system and it appears that the Guidelines have not eliminated this practice. This lack of specificity challenges the implementation and sustainability of PA in schools. Similar findings have been observed whereby PE didn’t constitute a priority in the school curriculum. Moreover, our findings documented that less than half of schools were offering “active recess” despite evidence of active recess as a recommended practice, and despite the School Guidelines’ mandate to offer daily active recess as a way to increase PA. This is unfortunate because children are being deprived the opportunity to engage in unstructured games that can be accessible for all students, regardless of athletic ability. The low implementation of active recess may be a signal of recurrent obstacles or a return to ‘old habits’, reminiscent of a time when this practice was banned in Mexico City schools by school authorities. Additionally, there may be other obstacles for offering active recess, such as lack of trained staff to organize and supervise it, a lack of physical space, and safety issues.

Principals and teachers indicated that they knew about curriculum changes related to the standards for health and physical education and most schools had access to qualified PE teachers who were meeting PE established standards. According to all school principals, the PE classes delivered at their schools met the curriculum standards of the School Guidelines. These positive
PE findings are encouraging given previous evidence that Mexican schools didn’t meet with curriculum standards. Finally, we found that walking or cycling to school and extra-curricular activity programs were largely nonexistent or infrequently reported. A potential explanation for the lack of walking or cycling routes/programs is that Mexico City is a crowded and unsecure urban city, which makes it unsafe for children to walk or bike to school, especially in the area where this study was conducted. Extra-curricular practices are also not feasible due to the school operating structure. For instance, the public Mexican school system has two school shifts (morning and afternoon) to cover the high demand for education. School facilities therefore are occupied from morning until evening with no available PA infrastructure. The urbanized environment and lack of PA friendly built environment has been reported as an obstacle to engaging in PA; Unfortunately our findings show that the Mexican school context is lacking in PA opportunities.

More than half of the key informants reported the restriction of food marketing inside the school; this finding is of great magnitude given that for years the food industry has aggressively targeted school children in Mexico City. Despite this improvement, these findings suggest that marketing practices inside schools are still a challenge and more training and supervision from SEP authorities is warranted. For example, there is evidence that Mexican food guideline ambiguities are promoting the development of new industrialized food items intended to secure the school market. Several Mexican consumer reports are documenting the proliferation of new products that deceive the school authorities and children with fake nutritional claims that only partially meet the food and beverage guidelines. Thus, the industry’s proliferation of new products—which make false claims about low sugar, low fat, and low sodium products—might be creating a confusing environment at schools. Recent reports suggest, for instance, that the industry has reduced portion sizes to adhere to guidelines, but has not increased the nutritional quality of their products.
Overall, this research has identified that the ANSA School Guidelines mostly complied with WHO international recommendations according to the WHO School Policy Framework, although they were not fully implemented within our sample. Results of the current findings are useful to understand and identify the challenges that might be interfering with the implementation, such as, low implementer capacity (due to a lack of training and resources) and ambiguity of tasks implementation and funding allocation. The findings of this research can be used by the federal government to improve the School Guidelines and to inform the childhood obesity school based interventions and policy in the near future.

**Strengths and Limitations**

To our knowledge this is the first attempt to assess the quality and the uptake of the ANSA School Guidelines in the early stages of implementation. The information in this paper identifies inadequacies in policy content and gaps in policy implementation, and identifies many areas for improvement. For instance, the results substantiate the need to improve information and training for School Guidelines for key implementers, specifically to improve the food and beverage availability at schools and to enhance awareness of the benefits of delivering regular PE classes. The findings suggest that SEP supervision, in addition to monitoring the implementation of the nutrition and PA policy objectives, is crucial. Moreover, identifying the presence of industrialized food and beverages in the schools as well as observing the practice of marketing non-healthy food items inside the schools is needed. Overall, the analysis of this legislation contributes to the call for the design and evaluation of stronger policies that promote healthy food and PA environments in schools to prevent childhood obesity in Mexico.

The limitations of the study include the small sample of southern Mexico schools that is not necessarily representative of the Mexican school system. Biases associated with the self-reported (response and recall bias) measures might have resulted in an overestimation of some variables perceived as positive or an underestimation of negative aspects. The list of indicators,
although comprehensive, was not exhaustive and there may be additional policy indicators relevant to the Mexican culture and/or to the Mexican public school system.

Only one researcher carried out the coding for policy quality and assessment of the 10 preconditions for perfect implementation, thereby impairing the validity of the current analysis. In order to overcome this limitation, a second native Spanish speaker has been recruited to code the policy documents. Finally, we acknowledge that this assessment was carried out when the School Guidelines were partially implemented and that our findings should be considered as preliminary.

CONCLUSIONS

Findings from this research suggest that both the School Guidelines, and in turn, their implementation must improve to achieve maximum potential. First, the School Guidelines can be improved by reducing ambiguity. The funding allocation and the definition of critical policy tasks (i.e., training), for instance, are challenges that must be addressed in order to assure successful policy implementation. Second, the early implementation of the School Guidelines looks promising for the institutionalization of future actions by the new Mexican administration. Policies take time to implement and both short and long term policy outcomes need to be regularly monitored.\cite{45, 59, 45}
REFERENCES


44. Peterson KE, Fox MK. Addressing the Epidemic of Childhood Obesity Through School-Based Interventions: What Has Been Done and Where Do We Go From Here? Journal of Law, Medicine & Ethics. 2007; Childhood Obesity:113-30.


50. Dirección General de Desarrollo de la Gestión e Innovación Educativa, Dirección General de Promoción de la Salud. Orientaciones para la Regulación del Expendio de Alimentos y Bebidas


52. Lineamientos Generales para la Operación de los Consejos Escolares de Participación Social, 533 (2010).


CHAPTER 7: GENERAL DISCUSSION AND CONCLUSION

7.1 Thesis Overview

The overall purpose of this thesis is to explore and document some of the actions regarding obesity prevention in the Mexican School System. Across four manuscripts, I address the following main objectives: (1) To describe the design and rationale of a socio ecological model-(SEM) based obesity prevention RCT implemented in 27 Mexico City schools; (2) To examine the impact of an SEM-based intervention program to prevent childhood obesity in Mexico City schools; (3) To examine the use of ecological principles and theoretical constructs in an SEM-based intervention program to prevent obesity in Mexico City schools; and (4) To assess the quality and implementation of a policy to prevent childhood obesity in the Mexican school system. The key findings, limitations, public health implications, and directions for new research will be described below.

7.2 Overall thesis key findings

The first manuscript, titled *Promoting a Healthful Diet and Physical Activity in the Mexican School System for the Prevention of Obesity in Children: Rationale, Design and Methods*, documents the environmental and individual evaluation methodologies used to assess the effectiveness of school based intervention to prevent childhood obesity. The assessment of the effectiveness of SEM school-based intervention programs is a controversial research topic in the scientific community due the lack of definitive recommendations on how to intervene and evaluate large-scale school-based intervention programs. The documentation of this intervention program and its evaluation methodology begins to address the paucity of obesity prevention implementation and evaluation research in México. This manuscript increases the transparency and comprehensiveness of reporting of research trials.

The second manuscript, titled *Impact of a School-based Intervention Program on Obesity Risk Factors in Mexican Children*, examines the effectiveness of a multicomponent multilevel SEM school-based intervention aimed at preventing obesity and promoting
behavioural change. This RCT trial compared pre and post intervention results between intervention schools and control schools during two school cycles. The intervention was divided into two intensity levels: eight schools received a basic intervention consisting of feasible interventions at low cost, and eight schools received the plus intervention consisting of more intensive interventions requiring greater investments. Changes in food availability at school supported by the education component were effective in improving both the food environment in schools and healthy behaviours in children. At intervention schools, the availability of recommended food such as fruits, vegetables, baked food items, and water significantly improved from the measurements taken at baseline to those taken at 7, 11, and 18 months. Moreover, intervention schools also showed substantial reductions in the availability of non-recommended food, such as salty and sweet snacks and sugared beverages. This reduction was especially evident in the basic modality compared to control.

This manuscript also documents behavioural changes among children as measured by improved quality of food intake and increased number of steps taken. The intake of recommended food in children increased significantly (P<0.05) from 16% at baseline to 33% at the end of the intervention in plus schools and in basic schools it increased in a meaningful but not significant (P>0.05) way across the three assessment periods. Furthermore, a significant decrease in the intake of non-recommended foods was documented in intervention schools relative to control schools. These changes were notable across the majority of the assessment periods and decreased from 59% at baseline to 24.6% at the end of the intervention in the plus group and from 58% at baseline to 36% at the end of the intervention in the basic group (P >0.05).

The food environment and food intake results from the present study are original findings related to the Mexican context and are congruent with findings from other studies that suggest that improvements in the school food environment could be translated into an increase in healthy food availability\(^7\text{-}12\) which in turn could increase children’s healthy food intake.\(^7,8,13,14\) Overall, the current findings further strengthen the evidence base from developed countries, which links
the school environment (i.e., food availability) to individual-level behaviour (i.e., food intake).\textsuperscript{1, 5, 7, 15-17}

In terms of children’s level of physical activity (PA), the number of steps taken at school significantly increased in basic (from 3323; 95%CI=3127,3520 to 3964 95%CI=3776,4153) and plus intervention groups (from 3724; 95%CI=3505,3943 to 4410 95%CI=4197,4624) schools and decreased in control groups (from 4490; 95%CI=4274,4706 to 3850 95%CI=3617,4084) during the first year. During year two, steps taken increased in a significant manner only in the basic group (491; 95%CI=123,860), whereas the control group decreased (-630; 95%CI=-1231,-28)

These findings are also original from the Mexican school context and congruent with other physical education (PE) school-based interventions, which have documented higher PA levels at school through the implementation of a PA intervention\textsuperscript{18} and which ideally could be associated with decreased BMI in children if the PA intervention is sustained over time.\textsuperscript{3} Overall, the findings in this manuscript represent an important contribution given the paucity of such research in Mexico.

The third manuscript, titled \textit{An Ecological and Theoretical Deconstruction of a School-based Obesity Prevention Program in Mexico}, assessed the degree of integration of the ecological principles and theoretical constructs involved in the implementation of a school-based intervention by health promotion (HP) practitioners in the Mexico school system. The analysis of this manuscript was based on the second year of data for the school-based intervention described in manuscripts one and two. This manuscript unpacked the intervention program and the intervention domains of influence and developed a map of the intervention program. The key findings showed that the intervention was a real multilevel and multicomponent intervention that consisted of 32 distinct nutrition and PA intervention strategies across four levels of influence: four individual (HP→IND); one intrapersonal (HP→INT); 15 organizational (HP→ORG); and 12 policy (HP→POL) strategies, all carried out at the school setting.

These results demonstrate how the HP team engaged individuals in the real world either
proximally or intermediately to produce a change. For instance, the ecological map of the Mexican school-based intervention yielded by the analysis allows us to infer that a combination of organizational and environmental changes, coupled with health education strategies, is related to health behaviour change in school-aged children. This finding supports the previously established notion that children are vulnerable to the surrounding environments and policies.

Overall, 69% of the interventions pertained to the nutrition domain and 31% were PA related. This analysis is crucial to the field of obesity prevention in Mexico, for it helps researchers and practitioners to understand how the resources were distributed and it identifies the scope of work expected in terms of nutrition and PA at school. For instance, it provides a realistic depiction of how things occur in real world settings, specifically with regards to how many resources are actually devoted to nutrition compared to PA in schools. These results provide novel information that will inform the implementation of nutrition and PA multifactorial interventions in school-based health promotion programs by highlighting the actions needed to impact different levels of influence across domains.

Furthermore, this manuscript also documents the use of Social Cognitive Theory (SCT) constructs within and between intervention domains by the HP practitioners. Overall, behavioural constructs were used less frequently in the PA domain compared to the nutrition domain. Even though there were no significant differences in the SCT construct use within domains, reciprocal determinism (RD) was reported as the most used in both domains. The HP workers’ use of RD signified their intention to change the existing environment, practices, and services relating to food and PA at school, which was congruent with the intervention program aims.

The assessment of the theoretical constructs used by HP workers will be useful in the training of HP workers and highlights the importance of using highly trained field work personnel in the implementation of projects relating to schools and children.

This manuscript documents the operative link between ecological programming and the HP practitioners’ behavioural intentions with the intervention program outcome results. Overall,
this manuscript focused on a program that has documented environmental and student behaviour improvements. The manuscript provided detailed documentation and analysis of the program’s effective combination of intervention strategies and theoretical constructs, and thus provides insight about the types of strategies that can be used for achieving optimal effects in schools using an ecological approach. Overall, this manuscript documented how the actions to prevent obesity in the Mexican School System were carried out. The deconstruction of a successful intervention program provides important information for the implementation of multifactorial interventions in school-based health promotion programs.

The manuscript titled *Quality and Implementation Assessment of the Mexican National Nutrition and Physical Activity School Policy Guidelines* addresses an important limitation of the current literature by assessing the quality and implementation of an obesity prevention policy aimed to impact the school environment and children's behaviours: namely, the new school guidelines, “Mexican National Guidelines for Healthy Eating in Schools (ANSA),” which are intended to promote healthy eating and activities and curriculum change to promote physical activity in schools.  

The quality of the policy and implementation preconditions were assessed through the analysis of 10 preconditions for perfect implementation suggested by Hogwood and Gunn. Analysis of the official policy documents showed that while some preconditions were partially met (i.e., consideration for external barriers, theory based), other preconditions were not even addressed (i.e., presence of minimal dependency relationships, timely resource allocation). Overall, the policy was ambiguous and the analysis identified policy gaps that might jeopardize the implementation. For instance, because the policy lacked a detailed consideration of financial and training resources for policy implementation, it could not be assumed that resource allocation would be sufficient and timely.

Moreover, this analysis revealed weaknesses in the policy's treatment of objectives, which, despite its professionalism, lacked a concrete description of task
management/implementation defining specifically when, what, and how the objectives will be met. Some objectives had technical descriptions, especially the nutritional guidelines, and thus could be subject to misinterpretations. Furthermore, there is no explicit information about how the SEP and SA assure the understanding of these objectives. The lack of specificity reveals that the ANSA objectives are policy intentions instead of SMART (Specific, Measurable, Acceptable, Realistic and with Time specification) formulated policy objectives, which has been shown elsewhere to make implementation, monitoring and evaluation difficult. Overall, the lack of specificity in task allocation, resource allocation, and training restricts the accountability of the policy implementation given that the tools to be accountable are not provided. Another important finding derived from this analysis is the lack of policy monitoring and evaluation systems to accompany the policy implementation, which compromises the possibility to improve the policy.

The School Guidelines implementation and the uptake of the WHO Diet and PA recommendations (DPA) strategy was assessed through the school policy framework indicators (SPF). Overall, these findings suggest that the School Guidelines nutrition and PA policy objectives were not implemented in the majority of the schools at the time of the data collection (second year of implementation), even though the majority of the schools had met the implementation operative indicators (i.e., having a School Council for Social Participation and a Canteen Committee). This finding is similar to studies in which the availability of regulations (i.e., School Guidelines) does not secure an improved school environment due to lack of implementation preconditions.

7.3 Overall thesis limitations

Limitations of the second study include attrition: during year two we lost a plus school and lost approximately 20% of our sample over the two years of intervention. In order to compensate for this loss, we applied intent to treat analysis by imputing missing variables as suggested (by age and sex) by the literature in RCTs. Although manuscript three documents the degree of interventions necessary across levels
to successfully impact the schools, the sample was not representative and uncertainty remains about the adequate dose to achieve an impact. As such, the findings in manuscript three may not be generalizable beyond the specific context of those Mexico City schools.

The limitations of the fourth study include a small sample limited to southern Mexico schools, which limits the generalizability of these results. In addition, the policy analysis was carried out by a single researcher (native Spanish speaker); this fact reduces the validity of the analysis biases the results. In order to compensate for this limitation and prior to submitting the manuscript for publication, the policy preconditions will be coded by another native Spanish researcher to solve discrepancies and increase the credibility of findings.

Lastly, some of this thesis’ findings are limited by potential social desirability bias given that the source of some of the data is from key informants who had a vested interest in proving program success.

7.4 Public health implications

Taken together, the four manuscripts have the potential to influence the design and implementation of school-based interventions and policies to prevent childhood obesity, not only in Mexico, but also worldwide. Findings from this thesis provide further evidence to support that school-based interventions to prevent obesity are feasible in Mexico and can be strengthened if they are in a partnership with the stakeholders and authorities (i.e., SEP and SA).

The findings of manuscript one and three provide original details of the implementation and evaluation process of a multilevel multicomponent school-based intervention in Mexico City. These findings constitute novel information on the design, assessment and implementation of interventions in school-based interventions and have significant implications in the public health arena, because they provide crucial insights into the types of intervention actions that need to be included in obesity prevention intervention programs in Mexico. Although our results show that the current formula was not sufficient to achieve BMI change, it did contain elements of success.
that should be included in future program models for testing. From a methodological standpoint, these manuscripts enhance our understanding of how to evaluate environmental and childhood dietary interventions. These insights will be useful for similar obesity prevention projects and programs, for they address the lack of validated and objective methodologies for environmental and behavioural modification (PA and dietary) interventions among children in Mexico.

Evidence from the intervention analysis procedure (IAP) systems approach in manuscript three could be considered a starting point to develop even more effective combinations of interventions in the Mexican context. The deconstruction of the program revealed the need for a thoughtful distribution of resources in a project and can be useful for public health program planners and researchers striving to integrate an ecological approach into their projects.

The main goal of this thesis was to influence the development of SEM obesity prevention interventions in emerging countries. The effectiveness findings documented in manuscript two demonstrated that it is possible to improve the school food and PA environment with low financial investment and with only the commitment of the school community, as the basic schools did. This finding is relevant for low-middle income countries that typically struggle to identify resources to implement preventive measurements at all levels. The findings of manuscript two also have promising implications for authorities at the school level, who are motivated to intervene but are often lacking resources.

The second manuscript demonstrates how an improved food environment enhanced healthy food intake by children in México. This key finding has implications for public health because it provides evidence in favour of regulating food availability in schools and banning processed energy dense foods. This manuscript aligns with findings from studies of school-based interventions in developed countries\textsuperscript{5,7,28} and thus contributes to a growing body of evidence that improving the environment is a viable strategy for addressing childhood overweight and obesity.\textsuperscript{7}

To address the lack of food guidelines at the time of implementation, the researchers of
the project designed and implemented a recommendation list that improved the availability of healthy food and beverages in intervention schools. In addition to enhancing the specific intervention, this list has been used outside of the study protocol to advocate for food guidelines to govern the food intake in Mexican schools at the federal level.²⁹

Furthermore, the improvement in steps in children documented in manuscript two supports the notion that even part time schools are an important setting to promote PA, especially in urban areas of Mexico City where there are few spaces and opportunities for safe PA. The successful implementation of PA interventions in schools such as active recess in year one and physical activation in year two served as examples to convince authorities that PA levels can be feasibly improved in school settings. Indeed, active recess and physical activation were considered in the National Strategy against the Overweight and Obesity, and are being implemented in Mexican schools as part of the federal School Guidelines to prevent obesity in schools (ANSA).³⁰ Another policy implication derived from manuscript two is that high quality of physical education sessions and double PE sessions are currently being promoted by the Federal Government as part of the School Guidelines as a means to improve PA in children.

We anticipate that the fourth manuscript can improve the policy content and inform the implementation of the “Mexican National Guidelines for Healthy Eating in Schools”²⁴ by addressing the inadequacies in funding allocation and training, and by reducing ambiguity in the task/objective implementation. To our knowledge the analysis presented in manuscript four is the first attempt to assess the quality and the uptake of School Guidelines in its early stages of implementation. This manuscript identified information gaps in policy content and implementation. For instance, the results substantiate the need to improve tasks, define training, and allocate resources for School Guidelines key implementers to comply with the nutrition and PE requirements. Moreover, the findings suggest that SEP should monitor and evaluate the implementation of the nutrition and PA policy objectives. For instance, there should be ongoing evaluation of the presence of industrialized food and beverages, the provision of drinking water,
and the cancellation of PE classes at schools. Overall, the analysis of this legislation contributes to the call for the design and evaluation of stronger policies that promote healthy food and PA environments in schools to prevent childhood obesity in Mexico. Because the policy was rooted in a public health initiative, the policy gaps that exist also need to be addressed from a public health perspective. For instance, the food and beverage guidelines need to be improved to reduce ambiguity and to minimize the presence of unhealthy homemade and industrialized foods within schools. Overall, the findings from this thesis support a call to mobilize additional measures and resources to prevent childhood obesity in Mexican schools. For example, recommendations from manuscript two include redefining the school breakfast program that delivers an energy dense breakfast and developing strategies to regulate the sale of competitive food (food not regulated in the School Guidelines) in the schools’ surroundings. In addition, these findings can be used to encourage sensitivity and awareness in the Mexican government about the growing problem of childhood obesity, the prevailing conditions within the Mexican School System, and potential interventions to actively combat childhood obesity.

7.5 Directions for further research

Findings from the four manuscripts within this thesis provide directions for future research regarding interventions and policies to prevent childhood obesity in the school setting. In regards to the design and evaluation of interventions, additional research with representative samples of schools within Mexico is needed to tailor the obesity prevention strategies to other areas and regions of the country in order to ensure the sustainability of the intervention program across the Mexican School System.

The findings of manuscript two did not demonstrate a positive effect on biological indicators such as BMI in children. The study was limited by the distribution of competitive foods inside and outside the school, potentially undermining intervention efforts. For instance, the federal school breakfast program (FSBP) distributed inside the schools provides high energy sweet and salty snacks to children, and the street vendors selling food outside the school provide
mainly sweet beverages, candies, and sweet and salty snacks (such as cookies and chips) at the beginning and the end of the school day. Exposure to both types of competitive foods and beverages may have confounded the results of the intervention, since they made energy-dense unhealthy food readily available to children in the intervention and control schools. The potential impact of the competitive food and beverages in the urban area of Mexico City has not yet been studied. Therefore, more research is needed to determine to what extent the FSBP is influencing the energy intake of beneficiary children at school and how the FSBP can be modified to benefit children at risk of obesity. In addition, future school-based projects to prevent obesity should characterize the immediate food environment in the school surroundings and identify its influence on the BMI of children attending the neighbourhood schools.

Conversely, given that children only spend four hours per day in school, the school-based PA programming represents only a small percentage of the potential opportunities for children to increase their PA. Nevertheless, there is a lack of information on how to improve PA in school-aged children to address the energy imbalance occurring at the Mexican public schools. Thus, future school-based RCT interventions should study different PA doses and measure them objectively (i.e., using accelerometers), to determine their impact on obesity risk factors. This information will be useful to determine the dose of PA and time needed to reduce the energy unbalance occurring at public part time school in México. If the energy imbalance at schools cannot be prevented, further school-based interventions need to identify ways to make after-school PA programs available at facilities in the community and to identify how to engage and motivate parents about the reduction of sedentary behaviours at home.

Another potential reason for not observing a biological impact of the intervention program could be the short duration of the intervention. Even though there are no definite recommendations for the length of ideal implementation, some researchers suggest that a length of more than two school cycles is needed to have impact in biological outcomes. Therefore,
more research is needed to implement a longitudinal program for more than two school cycles and to measure the biological effects of the program on children. Finally, recent research also suggests\textsuperscript{18, 31} that in order to have biological impacts, school-based interventions should have an additional component that involves parents and families in promoting behavioural change at home, such as packing a healthy lunch, engaging in PA, and reducing sedentary behaviour.\textsuperscript{8, 15} Research has shown that this familial home-based component would promote the sustainability of school-based strategies and optimize obesity prevention efforts.\textsuperscript{15, 33, 34} Therefore, future research should focus on overcoming the challenge of reaching parents and identifying sustainable preventive strategies to be implemented at home.

In regards to psychosocial determinants of behavioural change, the INSP-RCT implemented a theory based communication/education component to support the nutrition and PA interventions by increasing awareness, improving knowledge and increasing self-efficacy. The overall impact evaluation of the RCT did not assess the changes in the psychosocial determinants given that this component was not part of the original RCT aims. Further research should assess the use of psychosocial determinants for behavioural change in order to contribute to the understanding of behavioural change in the obesity prevention area in children. The identification of behavioural mediators and moderators will be crucial in the design of effective interventions to prevent obesity among school-age children, as several researchers have noted.\textsuperscript{35-37}

Manuscript three mapped the ecological principles used in the multilevel intervention; the results revealed an effective combination of interventions to improve the school environment and children’s behaviours, However this mix of interventions is not necessarily generalizable to other school settings (i.e., kindergartens, high schools, par-time schools). Therefore, future research should aim to determine: a) the optimal dose and mix of interventions in SEM school-based interventions,\textsuperscript{22, 38, 39} and, b) the effectiveness of similar intervention programs in different school settings, such as pre-school, elementary, high schools, and/or boarding schools where the children may receive a full hot meal. Moreover, there is research that questions the effectiveness of
multiple vs. single interventions to promote behavioural change and prevent childhood obesity in children. Further research should be focused on determining the most effective ways to prevent obesity in children either through a promotion of single or multiple behaviours at the same time. Finally, multilevel research could also assess the factors associated with energy imbalance such as excessive energy intake (i.e., food availability and food intake), vs. low energy expenditure (engaging in different dose of PA) at schools, and associated behavioural constructs (i.e., mediators and moderators) in boys and girls.

We faced many problems during the implementation of the intervention project, particularly during the first year of implementation. School resistance, political issues, and lack of awareness prevented the research team from fully implementing the intervention in length (the intervention was not implemented as originally intended). If strategies were properly regulated and institutionalized, assuring full implementation, then the full positive impact of the intervention might have been possible. That is, the findings of manuscript two might have been of greater magnitude. This assumption is based on the fact that similar interventions in developed countries that were implemented under less restrained conditions did indeed have a greater impact in obesity prevention. Therefore, potential directions for future research include examining whether there are other relevant environmental influences to take into account during design and implementation which might otherwise reduce the effectiveness of the intervention, such as: (1) lack of policies to support the intervention; (2) lack of parental involvement in school activities; (3) resistance or lack of motivation of teachers to participate.

In sum, if the INSP-RCT were to be carried out again, it would be important to address motivation and awareness about obesity in children among teachers and parents; to implement a parental component to extend the project reach beyond schools; to implement a comprehensive PA intervention that includes more time devoted to MVPA and to improve the assessment of PA (using accelerometers); to implement and evaluate a comprehensive education strategy that includes psychosocial determinants of behavioural change; and, to assess the school surrounding
Findings from manuscript four identify that the School Guidelines policy is ambiguous and thus its improvement might facilitate the implementation. Therefore, further research should evaluate the challenges to implementation after the improvement of the School Guidelines policy content. Moreover, a qualitative evaluation of the acceptance of the School Guidelines that include stakeholders' perspectives could be beneficial for the policy's sustainability in Mexico City and all the states within Mexico. Finally, future research should evaluate the effectiveness of the policy in the fight against childhood obesity risk factors.

7.6 Conclusions

Within in the field of health promotion, childhood obesity prevention strategies are gaining increasing attention. This thesis examined several layers of childhood obesity prevention research and practice, from designing a multilevel, muticomponent, ecological intervention, to assessing the impact, ecological principles, and behavioural constructs behind the intervention, to assessing a childhood obesity policy.

Given that obesity prevention in Mexican children is in its early stages—especially in comparison to research and practice in developed countries—these findings provide timely insight into obesity prevention among Mexican children. Moreover, this thesis expands the evidence base for obesity prevention for middle-income countries with similar circumstances and has the potential to inform the actions of health promoters and policy makers from low-middle income countries of Latin America.
Epilogue

My personal Ph.D. experience

During my doctoral training, I have had many opportunities to expand my academic knowledge by increasing my understanding of health promotion methodologies (including intervention design and evaluation), research methods, socioecological models (and their application to obesity prevention), behavioural change methodologies, policy evaluation, and promoting PA at the community level.

There are several important moments in my Ph.D. experience that have led to my development as an academic. Firstly, I gained extensive research experience in completing the present thesis. The thesis writing and reviewing process have refined my ability to assess the overall strengths and limitations within the existing literature and to critically assess the key findings and recommendations with regards to my thesis topic. Today I understand that critical thinking is a skill that is gained over time and by merging knowledge with experience.

As a student and teaching assistant (TA), I acquired knowledge in qualitative and quantitative research methodologies, including the application of data analysis and evaluation models. As a TA, I spent considerable time leading seminars in behavioural classes to increase students’ counselling skills. For four years I led a seminar that trained students in Motivational Interviewing skills; this gave me the opportunity both to demonstrate skills and to gain experience by teaching in a dynamic way.

Moreover, the experience of writing comprehensive exams provided me an opportunity to critically review the existing literature and develop critical thinking skills in order to respond to the comprehensive questions posed to me. As I wrote my thesis manuscript, I developed research questions and used evidence to support and justify my hypothesis. Moreover, I identified gaps in the research findings. Furthermore, I developed skills in general data analysis and learned complex analysis methodologies that overcame missing data and compared groups across times. I acquired a vast knowledge of SEM and school-based interventions and consolidated this
knowledge in IAP coding and analysis discussed in the third manuscript. Furthermore, towards the end of my Ph.D., I participated as a co-researcher in a funded policy evaluation grant proposal where I consolidated both my former experience and my newly-acquired Ph.D. knowledge by contributing to the research design, developing data collection strategies, and suggesting data analysis approaches.

Overall, my doctoral experience allowed me to link my former experience as a researcher with new skills and methodologies. During my time as a Ph.D. student I was able to disseminate research findings by participating in several academic conferences and through peer-reviewed published journal articles. Finally, my experience as a Mexican student within a Canadian academic environment provided me an opportunity to increase my awareness of the different sociocultural and ethical values that increase my understanding of capacity building in emerging countries.
REFERENCES


38. Richard L, Gauvin L, RaineK. Ecological Models Revisited: Their Uses and Evolution in


Appendix A

MANUSCRIPT 1
Award letter; ethics approval; consent and information letters for students and personnel at school and questionnaires.
August 2, 2005

Delivered via E-mail to: jrivera@insp.mx

Juan Angel Rivera Dommarco, M.S., Ph.D.
Director
National Institute of Public Health
Av. Universidad 655
Col. Sta. María Ahuacatitlán
Cuernavaca, Mor., México CP 62508

Dear Dr. Dommarco:

Congratulations! This correspondence confirms that your proposal, “Promoting Physical Activity and a Healthful Diet in the Mexican School System for the Prevention of Obesity in Children” has been selected to receive a research award by the Scientific Advisory Committee (SAC) of the Healthy Lifestyles, Healthy People Project targeting obesity prevention and health promotion in Latin America. This awards program is administered by the International Life Sciences Institute Research Foundation (ILSI RF) and the Pan American Health Organization (PAHO).

The final grant agreement will be finalized with details regarding report submission, payment schedule, and other project requirements of PAHO and ILSI RF once the following are completed:

1. A written response by you and/or your institution to a forthcoming email that will outline concerns or questions about your proposed project budget. If necessary, you may be asked to participate in a conference call for further clarification with representatives from the SAC, PAHO and ILSI.

2. Submission of a copy of your organization’s Institutional Review Board (IRB) approval for your project.

Again, congratulations on your research award. PAHO and ILSI RF are excited about the work you have proposed and look forward to receiving reports as the project progresses over the next two years.

Sincerely,

Suzanne Harris, Ph.D.
Acting Executive Director
ILSI Research Foundation

Enrique Jacoby, M.D., M.P.H.
Regional Adviser, Healthy Eating and Healthy Living
Pan American Health Organization

cc: ILSI & PAHO Representatives, México
Instituto Nacional de Salud Pública
Comisión de Ética

Cuernavaca, Mor., 1 de septiembre, 2005.
No. 107

Juan Ángel Rivera Dommarco
INVESTIGADOR RESPONSABLE
PRESENTE.

Por medio del presente me es grato informar a usted que el dictamen de la Comisión de Ética a su proyecto titulado "Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil" fue:

Aprobado

Le solicito atentamente que en caso de ocurrir algún cambio o actualización de datos que afecten el planteamiento actual de la Carta de Consentimiento Informado, lo comunique oportunamente a esta Comisión con la finalidad de registrarlo en el expediente de su proyecto. Si estos cambios llegaran a afectar, de manera diferente a la planteada, a los sujetos involucrados en la investigación, debe someterlos a consideración de esta Comisión.

ATENTAMENTE

DRA. LYNNETTE NEUFELD
PRESIDENTE DE LA COMISIÓN DE ÉTICA.

C.c.p. Dr. Mario Henry Rodríguez - Presidente de la Comisión de Investigación.
Dr. Carlos Conde - Presidente de la Comisión de Bioseguridad.
**Figure 1**: Conceptual and theoretical model to predict behavioural change in children according to McLeroy’s Ecological model and adapted from Lee RE.

- **POLICY**
  - National dietary and physical activity school policies

- **ORGANIZATIONAL**
  - Schools:
    - Food vendors
    - Class teachers
    - PE teachers
    - Dietary and PA supports
  - Dietary internal norms
  - Number of PE teachers
  - Type of food available
  - Internal norms
  - Local context

- **INTERVENTION**
  - Participation in the INSP-RCT:
    - Nutrition and PA Interventions + Communication/Education component

- **INTERPERSONAL**
  - Influence of external key actors:
    - Peers
    - Parents

- **INTRAPERSONAL**
  - Child Behaviour Change
    - Dietary practices
    - PA practices

- **Behavioural mediators**
  - Knowledge
  - Self-efficacy (SE)
  - Attitudes
  - Social Norms
**Model description:**

The intervention project based on the ecological model suggested by McLeary\(^1\) targeted three levels of influence simultaneously (i.e., organizational, interpersonal and intrapersonal) in order to promote behaviour change in children. The nutrition and PA intervention strategies were supported by a theory-based education/communication component that aimed to change behaviours by improving the knowledge and behavioural mediators (i.e., self-efficacy, attitudes and social norms).

The organizational level was the school and included nutrition and PA strategies to change the food and physical activity environment and supportive education/communication aimed to improve the knowledge and attitudes of school actors who had influence on the food intake and the PA in children at school. Five healthy eating and PA behaviours were addressed by implementing a theory-based mass communication social marketing strategy. The education/communication strategy was focused on improving the knowledge and behaviour mediators of class teachers, PE teachers, and food vendors by influencing attitudes about overweight and obesity and the nutrition and PA changes occurring at the school; decreasing resistance to the project and supporting children’s intentions to change. In addition intervention activities aimed to increase the self-efficacy of the key actors to make the environmental changes at schools. The intervention activities consisted of workshops, talks, motivational sessions and the provision of printing materials. The education/communication strategy at this level of influence also aimed to improve the social acceptance of the targeted behaviours by making them acceptable and “cool” for the children and focussed on actions that the children could take to achieve healthy behaviours. The environmental changes at the organizational level had direct influence on the interpersonal and intrapersonal levels.

The intervention at the interpersonal level targeted peers and parents. The interventions at this level aimed to increase peer and parent knowledge and attitudes towards overweight and obesity prevention and healthy eating and PA at schools. Peers and parents were reached through a mass media education/communication campaign that promoted healthy nutrition and PA messages via posters and
bulletin boards at school, pamphlets (i.e., how to pack a healthy lunch), and home newsletters (i.e., how to prevent obesity). At school, the mass education/communication supportive campaign increased the social acceptance of healthy eating and PA in peers by promoting child friendly messages using comic strips based on healthy and active superheroes. The changes at the interpersonal level were influenced by the changes at the organizational levels. In addition this level influenced the organizational level and the behavioural change in children by creating a supportive social environment for the children.

The intrapersonal level of influence consisted in targeting students from the 4th to 6th grades. At this level, the children received theory-based workshops in intervention schools. Thus, the nutrition and PA intervention and the supportive education/communication component targeted children directly and aimed to change five behaviours (i.e., be more active, eat fruits, eat vegetables, drink water and pack a healthy lunch) by enhancing attitudes, beliefs, and self-efficacy. The intervention was centered mainly on these three behavioural mediators given that they are documented drivers of nutrition and PA behaviours in children according to the literature.\textsuperscript{3,4} In addition, behavioural change at the individual level was directly influenced by the changes at the organizational and interpersonal levels given that children were exposed to the environmental changes at school and influenced by the key actors and parents and peers.

Overall, the dietary and PA behavioural change in children was designed to occur by implementation of the nutrition and PA intervention activities and the supportive education/component at the three levels of influence aimed at the behavioural mediators of the targeted behaviours.
REFERENCES


Febrero 2006

CARTA DE CONSENTIMIENTO: Consentimiento de los Padres para que su hijo(a) participe en una entrevista y Aceptación de su Hijo(a) para participar.

PROMOCIÓN DE ACTIVIDAD FÍSICA ADECUADA Y ALIMENTACIÓN SALUDABLE EN EL SISTEMA EDUCATIVO MEXICANO PARA LA PREVENCIÓN DE OBESIDAD INFANTIL

Estimado Señor / Señora:

Introducción/Objetivo:
En nombre del Instituto Nacional de Salud Pública y la Secretaría de Educación Pública le extendemos una cordial invitación para participar en un estudio que tiene como propósito la implementación y evaluación de una estrategia que modifique el medio ambiente de los escolares con el objeto de promover la actividad física adecuada y alimentación saludable de los mismos, mejorando así su composición corporal y su aptitud física.

Procedimiento:
Si acepta participar en el estudio se le harán una serie de preguntas confidenciales relacionadas con la alimentación de su hijo(a), se harán observaciones durante la clase de educación física, observaciones sobre los alimentos que su hijo consume en la escuela, mediciones antropométricas (peso, talla, pliegues), y una prueba de aptitud física: flexibilidad, capacidad aeróbica (se le pide al niño que corra durante 9 minutos, hasta donde pueda) y fuerza (se le pide al niño que realice algunas lagartijas). Las observaciones, entrevistas y mediciones serán realizadas por personal capacitado por el INSP. Tardaremos en formularle estas preguntas aproximadamente media hora, las mediciones antropométricas se estima realizarlas en 5 minutos, y la prueba de aptitud física será de aproximadamente 20 minutos. Estas mediciones se realizaran en 6 ocasiones a lo largo de todo el proyecto (año y medio). Si usted decide participar, estará colaborando con el Instituto Nacional de Salud Pública y la Secretaría de Educación Pública en nuestra misión de mejorar la educación y los servicios que se proporcionan a los niños.

Beneficios:
Si Usted y su hijo(a) está de acuerdo en participar, estará ayudando al Instituto Nacional de Salud Pública en su misión de investigar y encontrar soluciones con la finalidad de promover una actividad física adecuada y una alimentación saludable para mejorar la composición corporal y la aptitud física de los niños que asisten a las escuelas.

Participación /Retiro Voluntario:
Los niños que participen en este estudio serán aquellos que estén cursando los grados 4° y 5°. La participación en el estudio es totalmente voluntaria. Usted tiene el derecho a negarse a participar y abandonar en cualquier momento el estudio. El hecho de participar o no participar no afecta en nada los beneficios que el niño recibe de parte de la escuela ni ningún otro beneficio futuro.
Confidencialidad:

La información que obtendremos será completamente confidencial, se transportará directamente al Instituto Nacional de Salud Pública, a la oficina del Dr. Juan Rivera, y será de uso exclusivo de los investigadores participantes de este proyecto.

Contactos:

Usted tiene el derecho de recibir respuesta a cualquier pregunta acerca de los procedimientos, riesgos y beneficios relacionados con este proyecto. Para ello puede comunicarse con el Dr. Juan Rivera, responsable del mismo, al teléfono (01 777) 311 22 19. Para cualquier aclaración relacionada con sus derechos durante el estudio, podrá llamar a la Presidenta de la Comisión de Ética del INSP, Dra. Lynette Neufeld, al teléfono 01 (777) 329-3000 Extensión 7402. Al firmar la carta, usted acuerda que ha sido informado sobre los términos del estudio en lenguaje claro y comprensivo y que las dudas que han surgido respecto al mismo han sido resueltas.

Una copia de este documento de consentimiento le será entregada.

Consentimiento de los Padres o Tutor Para la participación de su Hijo (a)

Su firma indica su aceptación a que su hijo (a) participe voluntariamente en el presente estudio.

Nombre del Padre/Madre/Tutor del participante: ____________________________ Fecha: ________________

Día / Mes / Año

Firma: ____________________________

Relación con el niño: ____________________________
Aceptación del Menor a Participar

(Se obtendrá de manera oral cuando el menor se encuentra solo)

Nombre del niño(a):

__________________________________________________________

Se le ha explicado al niño(a), y ha aceptado participar: Fecha:

1. Si
2. No Día / Mes / Año

Testigo #1:

Fecha:

Parentesco con el menor participante: Día / Mes / Año

________________________

Testigo #2:

Fecha:

Parentesco con el menor participante: Día / Mes / Año

________________________

Nombre y firma del investigador que obtiene el consentimiento:

________________________

Atentamente,

Dr. Juan Rivera Dommarco
Responsable del Proyecto
Estimado Director(a):

Por medio de la presente me permito informar que como parte del proyecto hemos desarrollado un plan de comunicación en apoyo las estrategias que se están implementando en su escuela. El plan de comunicación consta de varios materiales que orientarán y acompañarán a todos los actores de la comunidad escolar en el cambio de conducta. El plan consta de:

1. **Folletos informativos**
   Para:
   - Los profesores de Educación Física: “Clase de Educación Física más activa”
   - Proveedores y miembros de la Cooperativa Escolar: “Consejos prácticos para vendedores de bebidas y alimentos”
   - Padres de familia: “Consejos para empacar un lunch barato, atractivo y saludable”

Los folletos para profesores de E.F. y proveedores los entregará personalmente el responsable de la escuela por parte del INSP. Los folletos que van dirigidos a los padres de familia, se entregaran en los grupos de 4º y 5º año por medio de los alumnos, se informará a los niños que dicho material es para sus padres y son unas recomendaciones para que se les preparen un lunch rico y sabroso que les va a gustar.

Los folletos dirigidos a los padres de los niños que conforman la muestra (33 niños) se acompañarán de una circular que deberán firmar los padres de enterados y con el apoyo de los maestros de grupo se regresará a la brevedad.

2. **Carteles**

Se han diseñado 6 carteles mostrando las 5 conductas a modificar con nuestro logotipo y personajes "Los Nutridinámicos" personajes de la campaña de comunicación, estos se distribuirán en la escuela periódicamente. Se colocará uno de cada uno por salón en los grupos de 4º y 5º año y dos ejemplares en el patio o áreas comunes de la escuela dirigidos al resto de la comunidad escolar

El propósito de este material es reforzar las estrategias de Alimentación y Actividad Física que actualmente se llevan a cabo en las escuelas con el propósito de lograr un ambiente saludable en las escuelas.
Pedimos nuevamente su cooperación y apoyo para realizar de la manera más óptima y eficaz la entrega de los materiales así como la distribución de los carteles y solicitamos su apoyo en el cuidado de estos materiales dado que su adecuada utilización apoyará el cambio que se quiere implantar en la escuela de una manera sostenible.

Sin más por el momento, agradecemos todas las facilidades brindadas durante el proyecto.

Atentamente,

Mtra. Margarita Safdie Kanan  
Coordinadora del proyecto  
Investigadora INSP

Nombre de la escuela:_____________________________________________________

Nombre y firma de la directora:_____________________________________________

Fecha:________________________
PROMOCIÓN DE ACTIVIDAD FÍSICA ADECUADA Y ALIMENTACIÓN SALUDABLE EN EL SISTEMA EDUCATIVO MEXICANO PARA LA PREVENCIÓN DE OBESIDAD INFANTIL

Estimado Sr. (a):

Introducción/Objetivo:
En nombre del Instituto Nacional de Salud Pública y la Secretaría de Educación Pública extendemos una cordial invitación para participar en un estudio que tienen como propósito la implementación y evaluación de una estrategia que modifique el medio ambiente de los escolares con el objeto de promover la actividad física adecuada y la alimentación saludable de los mismos, mejorando así su composición corporal y su aptitud física.

Procedimiento:
Si decide participar en el estudio se le hará una entrevista confidencial relacionada con la alimentación y/o educación física en las escuelas. Esa entrevista dura aproximadamente una hora.

Beneficios:
Si usted está de acuerdo en participar estará ayudando al Instituto Nacional de Salud Pública en su misión de investigar y encontrar soluciones con el fin de promover una actividad física adecuada y una alimentación saludable para mejorar la composición corporal y la aptitud física de los niños que asisten a las escuelas.

Participación/ Retiro Voluntario:
La participación en el estudio es totalmente voluntaria. Usted tiene el derecho a negarse a participar y abandonar en cualquier momento el estudio. El hecho de participar o no participar no afectan nada en los beneficios que el niño recibe por parte de la escuela ahora, o a futuro.

Confidencialidad:
La información que obtendremos será completamente confidencial, se transportará directamente al Instituto Nacional de Salud Pública, a la oficina del Dr. Juan Rivera, y será de uso exclusivo de los investigadores participantes de este proyecto.

Contactos:
Usted tiene el derecho de recibir respuesta a cualquier pregunta acerca de los procedimientos, riesgos y beneficios relacionados con este proyecto. Para ello puede comunicarse con el Dr. Juan Rivera, responsable del mismo, al teléfono (01 777) 3 11 22 19. Para cualquier aclaración relacionada con sus derechos durante el estudio, podrá llamar a la Presidenta de la comisión de Ética del INSP, Dra. Lynette Neufeld, al teléfono 01 (777) 329- 30-00 extensión: 7402. Al firmar la carta, usted acuerda que ha sido informado sobre los términos del estudio en lenguaje claro y comprensivo y que las dudas que han surgido respecto al mismo han sido resueltas.
Consentimiento de participación

Fecha:
Día / Mes / Año

Firma:
PROMOCIÓN DE ACTIVIDAD FÍSICA ADECUADA Y ALIMENTACIÓN SALUDABLE EN EL SISTEMA EDUCATIVO MEXICANO PARA LA PREVENCIÓN DE OBESIDAD INFANTIL

Estimado Director(a):

Por medio de la presente informo que durante la semana del 3 al 7 de septiembre el Instituto Nacional de Salud Pública, con autorización de la SEP, acudirá a la escuela para realizar pruebas de Condición Física (resistencia, flexibilidad y fuerza muscular) en 25 alumnos de 4° y 5° año seleccionados aleatoriamente. Posteriormente, durante el mes de septiembre, se acudirá a realizar las siguientes actividades:

- Observaciones de la entrada, recreo y salida
- Observaciones de clases
- Observaciones del desayuno escolar
- Observaciones de clase de E.F.
- Inventarios de alimentos
- Inventario de equipo deportivo
- Encuestas a 10 niños

Estas actividades se llevarán a cabo principalmente en los alumnos de 4° y 5° año, y se continuará trabajando con los 25 alumnos seleccionados previamente, en ellos se registrará la actividad física que realicen durante las clases de E.F. y recreo y llevarán durante una semana uno o dos instrumentos (4 niños) para medir la actividad física (podómetros y acelerómetros). La fecha exacta de nuestra visita se avisará con anticipación.

Este trabajo no representará un aumento en las responsabilidades o labores de los profesores o de los directores. Las actividades las llevará a cabo personal capacitado de INSP, todos uniformados y con credenciales de identificación.

La información que obtendremos será completamente confidencial, se transportará directamente al Instituto Nacional de Salud Pública, a la oficina del Dr. Juan Rivera, y será de uso exclusivo de los investigadores participantes de este proyecto. Para recibir respuesta a cualquier pregunta acerca de los procedimientos, riesgos y beneficios relacionados con este proyecto puede comunicarse con el Dr. Juan Rivera, responsable del mismo, al teléfono (01 777) 311 22 19, o con la coordinadora del proyecto Mtra. Margarita Safdie al (01 55) 54 87 10 27.

Atentamente,

_________________________
________________
Mtra. Margarita Safdie Kanan
Coordinadora del proyecto
Investigadora INSP
PROMOCIÓN DE ACTIVIDAD FÍSICA ADECUADA Y ALIMENTACIÓN SALUDABLE EN EL SISTEMA EDUCATIVO MEXICANO PARA LA PREVENCIÓN DE OBESIDAD INFANTIL

Estimado Padre/Madre de familia:

Dentro del proyecto que el INSP y la SEP realizan en la escuela, su hijo fue elegido para utilizar un cuenta-pasos (podómetro) y/o un sensor de movimiento (acelerómetro) colocados en un cinturón de tela durante 5 días, le pedimos su apoyo para el cuidado de estos instrumentos el cual es muy sencillo:

- Traer el cinturón con los aparatos durante todo el día
- No bañarse o mojarse con ellos.
- No dormirse con ellos.
- Colocarlos en la mañana al terminar de vestirse.
- Ajustar el cinturón para que no quede flojo jalando la cintilla y no cortarla.
- El cinturón debe quedar a la altura de la cintura y el instrumento a lado izquierdo o derecho del ombligo. (De acuerdo como fue colocado por la maestra)
- Tener cuidado en no tirarlo.
- No quitarlos del cinturón de tela.
- No intentar abrirlo ya que contiene información importante para el estudio.
- No prestarlos a nadie.
- No intercambiarlo con otros niños.
- No jugar con los aparatos.

DE ANTEMANO AGRADECEMOS SU APOYO Y COOPERACIÓN EN ESTE PROYECTO CUALQUIER DUDA PODRÁ LOCALIZARNOS EN LA ESCUELA.
PROMOCIÓN DE ACTIVIDAD FÍSICA ADECUADA Y ALIMENTACIÓN SALUDABLE EN EL SISTEMA EDUCATIVO MEXICANO PARA LA PREVENCIÓN DE OBESIDAD INFANTIL

Estimado Padre de Familia:
Como parte del proyecto que el Instituto Nacional de Salud Pública lleva a cabo en la escuela para mejorar la alimentación y la actividad física de sus hijos, se realizó un folleto para los padres de familia con el propósito de brindar información respecto a elaborar un lunch saludable para que sus hijos lo consuman en el recreo.

Solicitamos su apoyo en la revisión del folleto y le pedimos firmar en el talón de abajo anotando el nombre y grado de su hijo.

Sin más por el momento, le enviamos un cordial saludo.

Atentamente,

Mtra. Margarita Safdie Kanan
Coordinadora del proyecto
Investigadora INSP

NOMBRE DE LA ESCUELA: ______________________________________________________

NOMBRE DEL NIÑO: ___________________________________________________________

GRADO Y GRUPO: _________

FIRMA DEL PADRE, MADRE O TUTOR: ______________________________
**FIJA DE IDENTIFICACIÓN**

1. Tipo de formulario |____|
2. Código del observador |____|
3. Nombre de la escuela ________________________________
4. Código de la escuela |____|
5. Fecha de observación |____|____|____|____|____|____|
   Día mes Año

**OBSERVACIÓN DE COMPRA DE ALIMENTOS Y BEBIDAS FUERA DE LA ESCUELA A LA ENTRADA**

Número de observación |___|
Hora de inicio de observación ___ : ___ hrs.

7. Total de puestos de alimentos y bebidas |____|

8. Enlista los puestos de alimentos y bebidas

<table>
<thead>
<tr>
<th>Puesto</th>
<th>Puesto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>6.</td>
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<td>2.</td>
<td>7.</td>
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<tr>
<td>3.</td>
<td>8.</td>
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<tr>
<td>4.</td>
<td>9.</td>
</tr>
<tr>
<td>5.</td>
<td>10.</td>
</tr>
</tbody>
</table>

9. Anota cuales son los 3 puestos más frecuentados y los alimentos y bebidas más comprados (en orden de preferencia)

<table>
<thead>
<tr>
<th>Puesto</th>
<th>Alimentos y bebidas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ro</td>
<td></td>
</tr>
<tr>
<td>2do</td>
<td></td>
</tr>
<tr>
<td>3ro</td>
<td></td>
</tr>
</tbody>
</table>
Observaciones
(Sucesos que llamen tu atención en referencia al consumo de alimentos y bebidas)
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Hora de término de observación ___:___ hrs.

OBSERVACIÓN DE COMPRA DE ALIMENTOS Y BEBIDAS FUERA DE LA ESCUELA A LA SALIDA

Hora de inicio de observación ___:___ hrs.

10. Total de puestos de alimentos y bebidas [__][__]

11. Enlista los puestos de alimentos y bebidas

<table>
<thead>
<tr>
<th>Puesto</th>
<th>Puesto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td>2.</td>
<td></td>
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<td>3.</td>
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<tr>
<td>4.</td>
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<tr>
<td>5.</td>
<td></td>
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<tr>
<td>6.</td>
<td></td>
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<tr>
<td>7.</td>
<td></td>
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<tr>
<td>8.</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td></td>
</tr>
</tbody>
</table>

12. Anota cuáles son los 3 puestos más frecuentados y los alimentos y bebidas más comprados (en orden de preferencia)

<table>
<thead>
<tr>
<th>Puesto</th>
<th>Alimentos y bebidas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ro</td>
<td></td>
</tr>
<tr>
<td>2do</td>
<td></td>
</tr>
<tr>
<td>3ro</td>
<td></td>
</tr>
</tbody>
</table>

Hora de término de observación ___:___ hrs.

Observaciones
(Sucesos que llamen tu atención en referencia al consumo de alimentos y bebidas)
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
INSTITUTO NACIONAL DE SALUD PÚBLICA
CENTRO DE INVESTIGACIÓN EN NUTRICIÓN Y SALUD

“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

DESAYUNOS ESCOLARES

FICHA DE IDENTIFICACIÓN

1. Tipo de formulario   |   2. Código del observador   |
2. Código del observador   |
3. Nombre de la escuela   |
4. Código de la escuela   |
5. Fecha de observación   |
   Día  Mes  Año   |
6. Etapa de estudio   |
   (1. Basal, 2. Intermedio, 3. Final)   |

OBSERVACION DEL DÍA DE LA VISITA

7. Número de salones de 4to   |
   y 5to   |
8. El desayuno escolar se sirvió:
   a. Por grupo pregunta 9   |
   b. Todos los grupos en un mismo lugar pregunta 14   |
   c. No se sirvió   |

OBSERVACION DE UN SOLO GRUPO

9. Grado/grupo   |
10a. Número de niños del grupo   |
11a. Total de niños que tomaron el desayuno escolar   |
10. Horario en que se sirvió el desayuno observado   |
11. ¿Se sirvió el desayuno fuera del horario establecido?
   a. Si   |
   b. No   |
12. ¿En donde se sirvió el desayuno escolar?
   a. Salón de clases
   b. Salón de usos múltiples
   c. Otro ______________________

13. ¿Se permitió comer el desayuno escolar en el salón de clases?
   a. Si   pregunta 19
   b. No   pregunta 19

**OBSERVACION POR GRUPOS**

14. Grupos a los que se les sirvió el desayuno escolar en grupo (Marca con una X)
   
<table>
<thead>
<tr>
<th>to A</th>
<th>to B</th>
<th>to C</th>
<th>to A</th>
<th>to B</th>
<th>to C</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. Total de niños que tomo el desayuno escolar |___|___|

16. Horario en que se sirvió el desayuno observado |___|___| a |___|___|

17. ¿Se sirvió el desayuno fuera del horario establecido?
   a. Si
   b. No

18. ¿En donde se sirvió el desayuno escolar?
   a. Salón de clases
   b. Salón de usos múltiples
   c. Patio
   d. Otro ______________________

**OBSERVACION GENERAL**

19. ¿Quién lo sirvió?
   a. Maestra
   b. Mama (vocal)
   c. Niño (a)
   d. Otro ______________________

20. A cuantos niños se les permitió comer en el salón de clases |___|___|___|

21. ¿Qué alimentos y bebidas se sirvieron para el desayuno escolar? Marca con una X
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Cereal</td>
<td>2.1 Mazapán</td>
<td>3.1 Leche</td>
<td>de sabor</td>
</tr>
<tr>
<td>1.2 Pan</td>
<td>2.2 Palanqueta</td>
<td>3.2 Leche</td>
<td>sin sabor</td>
</tr>
<tr>
<td>1.3 Galletas</td>
<td>2.3 Fruta</td>
<td>3.3 Jugo</td>
<td></td>
</tr>
<tr>
<td>1.4 Barrita</td>
<td>2.4 Cacahuates</td>
<td>3.4 Otro</td>
<td></td>
</tr>
<tr>
<td>1.5 Otro</td>
<td>2.5 Otro</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22. Observa a 10 niños durante el desayuno escolar y registra cómo se comportan los niños ante los alimentos (si no hubo fruta no contestar esa parte).

23. Número de salones de 4to y 5to que sirvieron el desayuno en la hora propuesta [______]

24. Lugar en donde se sirvieron los otros desayunos

<table>
<thead>
<tr>
<th></th>
<th>to A</th>
<th>to B</th>
<th>to C</th>
<th>to A</th>
<th>to B</th>
<th>to C</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Salón de clases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Patio</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Salón de usos múltiples</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>Otro</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>No se sirvió</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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PREGUNTAS AL RESPONSABLE

Durante la semana pasada:

25. A que hora se sirvió el desayuno escolar |__|__| : |__|__| a |__|__| : |__|__|

26. Cuantas veces sirvieron los siguientes alimentos

<table>
<thead>
<tr>
<th>Alimento</th>
<th>N o. veces</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Cereal</td>
<td></td>
</tr>
<tr>
<td>b. Pan dulce</td>
<td></td>
</tr>
<tr>
<td>c. Galletas</td>
<td></td>
</tr>
<tr>
<td>d. Barrita</td>
<td></td>
</tr>
<tr>
<td>e. Mazapán</td>
<td></td>
</tr>
<tr>
<td>f. Palanqueta</td>
<td></td>
</tr>
<tr>
<td>g. Fruta</td>
<td></td>
</tr>
<tr>
<td>h. Cacahuates</td>
<td></td>
</tr>
<tr>
<td>i. Leche de sabor</td>
<td></td>
</tr>
<tr>
<td>j. Leche sin sabor</td>
<td></td>
</tr>
<tr>
<td>k. Jugo</td>
<td></td>
</tr>
<tr>
<td>l. Otro</td>
<td></td>
</tr>
</tbody>
</table>

Observaciones

___________________________________________________________________
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INSTITUTO NACIONAL DE SALUD PÚBLICA
CENTRO DE INVESTIGACIÓN EN NUTRICIÓN Y SALUD

“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

OBSERVACIÓN DEL CONSUMO DE ALIMENTOS Y BEBIDAS EN CLASES

FIJCA DE IDENTIFICACIÓN

4. Tipo de formulario  ||
2. Código del observador  ||
3. Nombre de la escuela ____________________________________________________________
4. Código de la escuela  ||
5. Fecha de observación ||||  ||
   Día  Mes  Año
6. Grado y Grupo  ||

OBSERVACIÓN DEL CONSUMO DE ALIMENTOS Y BEBIDAS EN CLASES ANTES DEL RECREO

8. Número de observación  ||
9. Número total de niños en la clase  ||
10. Pregunta cuantos niños desayunaron antes de venir a la escuela  ||

Hora de inicio de la observación ||:|| hrs.

Observa una clase completa en el turno de la mañana (antes del recreo). Observa el consumo de alimentos y bebidas en esta clase y describe la información que se te pide a continuación.

11. ¿Se consume algún alimento en el salón de clase?
   1. Sí
   2. No

12. ¿Se consume alguna bebida en el salón de clase?
   1. Sí
   2. No pregunta 14
13. Observa a los niños y anota cuáles son los alimentos y bebidas que consumen los niños durante este periodo (sólo anota a los niños que estén comiendo, no importa que sólo sean 3 ó 4, no es necesario llenar las 10 filas)

<table>
<thead>
<tr>
<th>Niños observados</th>
<th>Tipo de alimento y/o bebida</th>
<th>Come libremente</th>
<th>Come a escondida s</th>
<th>Comparte los alimentos</th>
<th>Otros</th>
</tr>
</thead>
<tbody>
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<td>Si</td>
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</tbody>
</table>

**COMPORTAMIENTO DEL DOCENTE ANTE EL CONSUMO DE ALIMENTOS Y/O BEBIDAS EN CLASE ANTES DEL RECREO**

14. Observa y anota los comentarios que hace el docente hacia el consumo de alimentos y/o bebidas (deja que los niños comen libremente, les prohíbe que coman, los regaña, es indiferente, no dice nada, etc.)

____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

14. ¿Hay alimentos o bebidas que el docente PERMITE consumir?
   1. SI ¿Cuáles?
   2. NO

15. ¿Hay alimentos o bebidas que el docente PROHIBE consumir?
   1. SI ¿Cuáles?
   2. NO

16. ¿El docente consume alimentos y/o bebidas dentro del salón de clases?
   1. SI ¿Cuáles?
   2. NO

17. ¿Salió el profesor del salon de clases?
   1. SI
   2. NO pregunta 20

18. ¿Los niños consumieron algun alimento en su ausencia?
   1. SI
2. NO pregunta 20

19. ¿Cuántos lo hicieron? _______

OBSERVACIÓN DEL CONSUMO DE AGUA DENTRO DEL SALÓN DE CLASES
ANTES DEL RECREO

20. ¿Hay garrafón de agua o agua natural disponible dentro del salón?
   1. SI
   2. NO

21. Durante la clase cuántos niños (as) toman natural y de donde:

<table>
<thead>
<tr>
<th>No. de niños</th>
<th>Garrafón</th>
<th>Lunch / cilindro</th>
<th>Otro</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Niños</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Maestros</td>
<td></td>
<td></td>
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</tbody>
</table>

Hora final de la observación ___:___ hrs.

Observaciones.
(Sucesos que llamen tu atención, en referencia al consumo de alimentos y bebidas dentro del salón de clases (ej. fue un día festivo, etc.) información no contemplada en las opciones que consideres relevante)

-------------------------------------------------------------------------------------------------

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OBSERVACIÓN DEL CONSUMO DE ALIMENTOS DENTRO DEL SALON DE CLASES DESPUÉS DEL RECREO

Hora de inicio de la observación [__:__] hrs.

Observa la misma clase después del recreo. Observa el consumo de alimentos y bebidas en esta clase y describe la información que se te pide a continuación.

24. ¿Se consume algún alimento y/o bebida en el salón de clase?
   a. SI
   b. NO pasa a pregunta 26

25. Observa a los niños y anota cuáles son los alimentos y bebidas que consumen los niños durante este periodo (sólo anota a los niños que estén comiendo, no importa que sólo sean 3 ó 4, no es necesario llenar las 10 filas)

<table>
<thead>
<tr>
<th>Niños observados</th>
<th>Tipo de alimento y/o bebida</th>
<th>Come libremente</th>
<th>Come a escondidas</th>
<th>Comparte los alimentos</th>
<th>Otros</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Si</td>
<td>No</td>
<td>Si</td>
<td>No</td>
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<td>10</td>
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<td>Si</td>
<td>No</td>
<td>Si</td>
<td>No</td>
</tr>
</tbody>
</table>

COMPORTAMIENTO DEL DOCENTE ANTE EL CONSUMO DE ALIMENTOS Y/O BEBIDAS EN CLASE DESPUÉS DEL RECREO

26. Observa y anota los comentarios que hace el docente hacia el consumo de alimentos y/o bebidas (deja que los niños comen libremente, les prohíbe que coman, los regaña, es indiferente, no dice nada, etc.)

____________________________________________________________________________________
____________________________________________________________________________________

27. ¿Hay alimentos o bebidas que el docente PERMITE consumir?
   1. SI ¿Cuales?
   2. NO

28. ¿Hay alimentos o bebidas que el docente PROHIBE consumir?
1. SI ¿Cuales?___________________________________________________
2. NO

29. ¿El docente consume alimentos y/o bebidas dentro del salón de clases?
   1. SI ¿Cuales?___________________________________________________
   2. NO

30. ¿Salió el profesor del salón de clases?
   1. SI
   2. NO pase a pregunta 33

31. ¿Los niños consumieron algún alimento en su ausencia?
   1. SI
   2. NO pase a pregunta 33

32. ¿Cuántos lo hicieron? ____________

---

**OBSERVACIÓN DEL CONSUMO DE AGUA DENTRO DEL SALÓN DE CLASES DESPUÉS DEL RECREO**

33. ¿Hay garrafón de agua o agua disponible dentro del salón?
   1. SI
   2. NO pasa a pregunta 35

34. Durante la clase cuántos niños (as) toman agua natural y de donde la obtienen:

<table>
<thead>
<tr>
<th>No. de niños</th>
<th>Garrafón</th>
<th>Lunch</th>
<th>Otro</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Niños</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Maestros</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**ACTIVIDAD FÍSICA EN EL SALÓN**

35. Durante la clase, ¿Se promovió la actividad física?
   1. SI
   2. No pase a la hora final

36. ¿Qué tipo de actividad realizaron?
   1. Relajación
   2. Calentamiento
   3. Flexibilidad
   4. Otro ______________________

37. ¿Cuánto tiempo duró? _____________________
   1. Menos de 5 minutos
   2. Entre 10-20 minutos
   3. Más de 20 minutos
Hora final de la observación [__|__]:[__|__] hrs.

Observaciones.
(Sucesos que llamen tu atención, en referencia al consumo de alimentos y bebidas dentro del salón de clases (ej. fue un día festivo, etc.) información no contemplada en las opciones que consideres relevante)

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________

____________________________________________________________________________________
FICHA DE IDENTIFICACIÓN

5. Tipo de formulario |__|__|  2. Código del observador |__|__|
3. Nombre de la escuela ____________________________________________
4. Código de la escuela |__|__|
5. Fecha de observación |__|__|__|__|__|
   Día       Mes       Año

RECREO ESCALONADO

7. Número de observación |__|
8. ¿Se cumple con el recreo escalonado?
   a. Sí
   b. No pase a la pregunta 18
9. ¿Se realizó alguna actividad dirigidas durante el recreo escalonado?
   a. Sí ¿cuáles?______________________________________________
   b. No
10. ¿Se utilizó algún material para hacer actividad física?
    a. Sí ¿cuáles?______________________________________________
    b. No
11. ¿Se utilizó la caja de actividades?
    a. Sí
    b. No ¿Por qué?____________________________________________
12. ¿Quién dirigió la actividad? (circula la opción que corresponda, puede ser más de una)
    a. Maestro
    b. Profesor de educación física
    c. Alumno
    d. Otro_________________
13. Durante el recreo escalonado observa cuál fue el comportamiento de los docentes de guardia hacia la actividad física:
<table>
<thead>
<tr>
<th>Docente</th>
<th>Tipo de actividad física que realizó</th>
<th>¿Promovió la actividad física?</th>
<th>¿Supervisó la actividad física?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>si</td>
<td>no</td>
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</tbody>
</table>

14. ¿Cuánto duró la actividad? [_____] hrs. [_____] min.

15. Porcentaje estimado de niños que participaron en la actividad [_____] 

16. Numero de niños participaron en la actividad (aproximadamente) [_____] 

17. Numero de niñas participaron en la actividad (aproximadamente) [_____] 

**CONSUMO DE ALIMENTOS**


20. Durante el recreo escalonado, ¿que tipo de actitud tiene el docente ante los alumnos y cual es su propia práctica alimentaria?

<table>
<thead>
<tr>
<th>No. docente</th>
<th>Que alimentos y/o bebidas consume</th>
<th>¿En que momento del recreo escalonado los consume?</th>
<th>Interactúan con los alumnos (juegan, comen, etc.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>Si  No</td>
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<td>Si  No</td>
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<table>
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<th>No. docente</th>
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<th>Interactúan con los alumnos (juegan, comen, etc.)</th>
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<tr>
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<td>Si  No</td>
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**Observaciones.**

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“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

LUNCH DE LOS ESCOLARES

FICHA DE IDENTIFICACIÓN

2. Tipo de formulario |___|
   2. Código del observador |___|

3. Nombre de la escuela ____________________________________________________

4. Código de la escuela |___|

5. Nombre del niño _________________________________________________________

6. Folio del niño |___| |___| |___| |___| |___| |___|
   7. Fecha de observación |___| |___| |___| |___| |___| |___|
   Día
   Mes   Año

7. Grado y Grupo |___|


LUNCH DE LOS ESCOLARES

ENCUESTA

9. ¿Cómo llegas a la escuela?
   a. Caminando
   b. En carro
   c. En transporte Público
   d. Bicicleta
   e. Otro __________________________
   f. Algunos días en carro y algunos días caminando.

10. ¿Desayunaste hoy antes de venir a la escuela?
   1. SI pregunta 11
   2. NO pregunta 12

11. ¿Qué desayunaste? (especificar que es el desayuno de la casa)

__________________________________________________________________________
__________________________________________________________________________
LUNCH DE LOS ESCOLARES ENCUESTA

12. ¿Normalmente traes lunch a la escuela?
   1. Si pregunta 14
   2. No

13. ¿Por qué? pregunta 22
   g. No me lo hacen
   h. No me gusta
   i. Por flojera
   j. Prefiero dinero
   k. No hay en casa
   l. Otro________________________

14. ¿Cuántas veces a la semana traes lunch a la escuela?
   
   
   1  2  3  4  5

15. ¿Quién prepara tu lunch? Puedes seleccionar mas de una opción
    a. Niño
    b. Mamá
    c. Papá
    d. Hermano (a)
    e. Abuelo (a)
    f. Comprado
    g. Otro __________

16. ¿Quién decide qué traes de lunch?
    a. Niño
    b. Mamá
    c. Hermano (a)
    d. Abuelo (a)
    e. Ambos __________
    f. Otro __________

17. ¿Te gusta traer lunch a la escuela?
    1. Si
    2. No ¿por qué?___________________________________________
18. ¿Cuál es casi siempre qué trae de almuerzo a la escuela?

<table>
<thead>
<tr>
<th>Alimento</th>
<th>Especificaciones (Tipo, ingredientes, gr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Dinero</td>
<td></td>
</tr>
<tr>
<td>b. Fruta</td>
<td></td>
</tr>
<tr>
<td>c. Verdura</td>
<td></td>
</tr>
<tr>
<td>d. Sándwich</td>
<td></td>
</tr>
<tr>
<td>e. Torta</td>
<td></td>
</tr>
<tr>
<td>f. Maruchan</td>
<td></td>
</tr>
<tr>
<td>g. Guisado</td>
<td></td>
</tr>
<tr>
<td>h. Nuggets</td>
<td></td>
</tr>
<tr>
<td>i. Quesadilla</td>
<td></td>
</tr>
<tr>
<td>j. Sincronizada</td>
<td></td>
</tr>
<tr>
<td>k. Pan dulce</td>
<td></td>
</tr>
<tr>
<td>l. Pan industrializado</td>
<td></td>
</tr>
<tr>
<td>m. Salchicha guisada</td>
<td></td>
</tr>
<tr>
<td>n. Hot dog</td>
<td></td>
</tr>
<tr>
<td>o. Barras de cereal</td>
<td></td>
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<tr>
<td>p. Galletas</td>
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</tr>
<tr>
<td>q. Papas</td>
<td></td>
</tr>
<tr>
<td>r. Agua de sabor</td>
<td></td>
</tr>
<tr>
<td>s. Agua Natural</td>
<td></td>
</tr>
<tr>
<td>t. Boing/Frutsi</td>
<td></td>
</tr>
<tr>
<td>u. Refresco</td>
<td></td>
</tr>
<tr>
<td>v. Gelatina</td>
<td></td>
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<tr>
<td>w. Flan</td>
<td></td>
</tr>
<tr>
<td>x. Danonino</td>
<td></td>
</tr>
<tr>
<td>y. Yogurt</td>
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<tr>
<td>z. Yakult</td>
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<tr>
<td>Otro</td>
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</tbody>
</table>
19. ¿Qué es lo más te gusta traer de lunch?

<table>
<thead>
<tr>
<th>Alimento</th>
<th>Especificaciones (Tipo, ingredientes, gr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Dinero</td>
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<tr>
<td>b. Fruta</td>
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<td>c. Verdura</td>
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<td>e. Torta</td>
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<td>f. Maruchan</td>
<td></td>
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<tr>
<td>g. Guisado</td>
<td></td>
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<tr>
<td>h. Nuggets</td>
<td></td>
</tr>
<tr>
<td>i. Quesadilla</td>
<td></td>
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<tr>
<td>j. Sincronizada</td>
<td></td>
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<tr>
<td>k. Pan dulce</td>
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<tr>
<td>l. Pan industrializado</td>
<td></td>
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<tr>
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<td>q. Papas</td>
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<td>r. Agua de sabor</td>
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<tr>
<td>s. Agua Natural</td>
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<td>u. Refresco</td>
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<td>v. Gelatina</td>
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<td>w. Flan</td>
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<tr>
<td>x. Danonino</td>
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<tr>
<td>y. Yogurt</td>
<td></td>
</tr>
<tr>
<td>z. Yakult</td>
<td></td>
</tr>
<tr>
<td>Otro</td>
<td></td>
</tr>
</tbody>
</table>
20. ¿Cuántas veces a la semana traes en tu lunch fruta?

0 1 2 3 4 5

21. ¿Cuántas veces a la semana traes en tu lunch verdura?

0 1 2 3 4 5

22. ¿Cuántas veces a la semana te dan dinero para que compres lunch en el recreo?

0 pregunta 27 1 2 3 4 5

23. ¿Cuánto dinero te dan al día aproximadamente? [_______] [_____]
24. ¿Qué es lo que más te gusta comprar en el recreo?

<table>
<thead>
<tr>
<th>Alimento</th>
<th>Especificaciones (ingredientes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Fruta</td>
<td></td>
</tr>
<tr>
<td>b. Verdura</td>
<td></td>
</tr>
<tr>
<td>c. Sándwich</td>
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<tr>
<td>d. Torta</td>
<td></td>
</tr>
<tr>
<td>e. Tacos de guisado</td>
<td></td>
</tr>
<tr>
<td>f. Yogurt</td>
<td></td>
</tr>
<tr>
<td>g. Banderillas</td>
<td></td>
</tr>
<tr>
<td>h. Pizza</td>
<td></td>
</tr>
<tr>
<td>i. Molletes</td>
<td></td>
</tr>
<tr>
<td>j. Quesadillas</td>
<td></td>
</tr>
<tr>
<td>k. Tostadas</td>
<td></td>
</tr>
<tr>
<td>l. Donas</td>
<td></td>
</tr>
<tr>
<td>m. Nachos</td>
<td></td>
</tr>
<tr>
<td>n. Paletas de hielo</td>
<td></td>
</tr>
<tr>
<td>o. Chicharrones</td>
<td></td>
</tr>
<tr>
<td>p. Papas fritas</td>
<td></td>
</tr>
<tr>
<td>q. Hot dogs</td>
<td></td>
</tr>
<tr>
<td>r. Hamburguesas</td>
<td></td>
</tr>
<tr>
<td>s. Otro</td>
<td></td>
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<tr>
<td>t. Otro</td>
<td></td>
</tr>
<tr>
<td>u. Otro</td>
<td></td>
</tr>
<tr>
<td>v. Otro</td>
<td></td>
</tr>
</tbody>
</table>

25. ¿Te gastas todo el dinero que te mandan en el recreo?
   1. Si pregunta 27
   2. No

26. ¿Qué haces con el dinero que te sobra?
   1. Lo guardo para el siguiente día
   2. Lo ahorro
   3. Compro algo en la salida ____________________
   4. Se lo regreso a mi mamá
5. Otro _________________________________

27. ¿Qué prefieres traer a la escuela dinero o lunch?
   1. Dinero
   2. Lunch
   3. Ambos

¿Por que?
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________
28. Observa el lunch que trae el niño y anótalo en la tabla, si el producto que trae no se encuentra en lista, registralo en las 3 últimas filas. En las especificaciones registra los ingredientes del lunch o el tipo de producto si es industrializado.

Pregunta si trae dinero para el día de hoy y cual es la cantidad y registralo

<table>
<thead>
<tr>
<th>Alimento</th>
<th>Especificaciones (Tipo, ingredientes, gr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Dinero</td>
<td></td>
</tr>
<tr>
<td>b. Fruta</td>
<td></td>
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<tr>
<td>c. Verdura</td>
<td></td>
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<tr>
<td>d. Sándwich</td>
<td></td>
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<tr>
<td>e. Torta</td>
<td></td>
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<tr>
<td>f. Maruchan</td>
<td></td>
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<tr>
<td>g. Guisado</td>
<td></td>
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<tr>
<td>h. Nuggets</td>
<td></td>
</tr>
<tr>
<td>i. Quesadilla</td>
<td></td>
</tr>
<tr>
<td>j. Sincronizada</td>
<td></td>
</tr>
<tr>
<td>k. Pan dulce</td>
<td></td>
</tr>
<tr>
<td>l. Pan</td>
<td></td>
</tr>
<tr>
<td>m. Salchicha guisada</td>
<td></td>
</tr>
<tr>
<td>n. Hot dog</td>
<td></td>
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<tr>
<td>o. Barras de cereal</td>
<td></td>
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<tr>
<td>p. Galletas</td>
<td></td>
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<tr>
<td>q. Papas</td>
<td></td>
</tr>
<tr>
<td>r. Agua de sabor</td>
<td></td>
</tr>
<tr>
<td>s. Agua Natural</td>
<td></td>
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<tr>
<td>t. Boing/Frutsi</td>
<td></td>
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<tr>
<td>u. Refresco</td>
<td></td>
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<tr>
<td>v. Gelatina</td>
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<tr>
<td>w. Flan</td>
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<tr>
<td>x. Danonino</td>
<td></td>
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<tr>
<td>y. Yogurt</td>
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<td>z. Yakult</td>
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</tbody>
</table>
29. Actividades que realizó durante el recreo
   a. Comió
   b. Comió y jugó
   c. Jugo
   d. Camino
   e. Otro_____________________

30. ¿A qué hora comió los alimentos?
   a. 1ros 15 minutos
   b. 2dos 15 minutos
   c. Ambos
   d. No comió Fin del cuestionario

31. Lugar donde comió
   a. Piso
   b. Patio
   c. Salón
   d. Pasillo
   e. Otro_____________________

32. Enlista lo que compró en el recreo y la cantidad

<table>
<thead>
<tr>
<th>Alimento o Bebida</th>
<th>Cantidad</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
33. Observa lo que comió el niño, la cantidad, las especificaciones (tipo, ingredientes, gr), si se comió toda la porción y si el alimento fue comprado, traído de casa o compartido por algún amigo (anota el número correspondiente).

<table>
<thead>
<tr>
<th>Alimento observado</th>
<th>ant.</th>
<th>Especificaciones (Tipo, ingredientes, gr)</th>
<th>Con sumió toda la porción</th>
<th>Comprado</th>
</tr>
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<td>2. Lunch</td>
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<td>3. Compartido</td>
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</table>
## INVENTARIO DE PUESTOS, ALIMENTOS, BEBIDAS Y AGUA

### FICHA DE IDENTIFICACIÓN

1. Tipo de formulario  |  
2. Código del observador  |  |

3. Nombre de la escuela  

4. Código de la escuela  |  |

5. Fecha de observación  |  |  |  |  |  |
   Día  Mes  Año

7. Observa los proveedores que se colocan dentro de la escuela a la hora del recreo. Elabora un croquis donde ubiques los proveedores y numéralos, junto al dibujo menciona el tipo de proveedor que es (tacos de guisado, chicharrones, postres, etc). Mide (con pies) cuanto espacio se usa para la venta de alimentos por puesto y registra quien elabora el producto, si son los mismos vendedores o los productos pertenecen a una cadena de alimentos que se los dan a vender.

<table>
<thead>
<tr>
<th>Puestos</th>
<th>No. de pies/cm</th>
<th>Preparación</th>
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<tbody>
<tr>
<td></td>
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<td>1. Vendedor</td>
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<table>
<thead>
<tr>
<th>PUESTOS DISPONIBLES</th>
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</thead>
<tbody>
<tr>
<td>8. Espacio total para la venta de alimentos [<strong><strong>]. [</strong></strong>] mts.</td>
</tr>
<tr>
<td>9. Numero de puestos totales en el recreo [____]</td>
</tr>
<tr>
<td>10. Numero de puestos que vendieron alimentos prohibidos [____]</td>
</tr>
<tr>
<td>11. No. De puestos solo de fruta y verdura [____]</td>
</tr>
<tr>
<td>12. Hora en que inicia la venta <em>:</em>:_ hrs.</td>
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<tr>
<td>13. Hora en que termina la venta <em>:</em>:_ hrs.</td>
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</tbody>
</table>
14. Detalla el tipo de productos alimenticios que se encuentran disponibles en la cooperativa escolar.

14.1. Frutas y verduras

<table>
<thead>
<tr>
<th>No. de puesto</th>
<th>Producto</th>
<th>Lunes</th>
<th></th>
<th></th>
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<th>Miércoles</th>
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<th>Viernes</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Cantidad Inicial</td>
<td>Cantidad Final</td>
<td>Diferencia</td>
<td>Gramos ración</td>
<td>Costo ($)</td>
<td>Cantidad Inicial</td>
<td>Cantidad Final</td>
<td>Diferencia</td>
<td>Cantidad Inicial</td>
<td>Cantidad Final</td>
<td>Diferencia</td>
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</tbody>
</table>
## ALIMENTOS DISPONIBLES

<table>
<thead>
<tr>
<th>No. de puesto</th>
<th>Producto</th>
<th>Lunes</th>
<th>Miércoles</th>
<th>Viernes</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cantidad Inicial</td>
<td>Cantidad Final</td>
<td>Diferencia</td>
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<td>Cantidad Inicial</td>
<td>Cantidad Final</td>
<td>Diferencia</td>
</tr>
</tbody>
</table>

268
14.2. Otros alimentos

ALIMENTOS DISPONIBLES

14.3. Dulces, boing y agua

<table>
<thead>
<tr>
<th>Producto</th>
<th>Lunes</th>
<th>Viernes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cantidad Inicial</td>
<td>Cantidad Final</td>
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</tbody>
</table>

15. ¿Qué puestos son los más frecuentados por los niños?

<table>
<thead>
<tr>
<th>Puesto</th>
<th>No. de Puesto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ro</td>
<td></td>
</tr>
<tr>
<td>2do</td>
<td></td>
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<tr>
<td>3ro</td>
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</tbody>
</table>
16. Pregunta la forma de preparación, los ingredientes y las cantidades que se utilizan para elaborar cada producto. Registra cuantas raciones aproximadamente se obtienen de la preparación.

<table>
<thead>
<tr>
<th>Ingredientes</th>
<th>Cantidad</th>
<th>Preparación</th>
</tr>
</thead>
<tbody>
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</table>
INVENTARIO DE BEBEDEROS O AGUA DISPONIBLE EN FORMA GRATUITA

Describe las características de los contenedores de agua gratuita.

17. Total de grupos de 4to y 5to en las escuelas | | |

18. ¿Hay bebederos en la escuela?
   a. Si
   b. No pregunta 23

19. No. de bebederos | | |

20. Cuantos funcionan | | |

21. Condiciones de higiene de los bebederos
   a. Limpio
   b. Con hojas de árbol
   c. Con polvo
   d. Con basura
   e. Oxidados
   f. Rotos

22. Ubicación______________________________

23. ¿Hay garrafones de agua disponibles para los niños?
   c. Si
   d. No pregunta 28

24. No de garrafones | | |

25. Cuantos funcionan | | |

26. Condiciones de higiene de los garrafones
   a. Limpio
   b. Vacío
   c. Rotos
   d. Con polvo
   e. Otro______________________________

27. Ubicación
   f. Patio
   g. Pasillo
   h. Dirección
   i. Otro______________________________
INVENTARIO DE BEBEDEROS O AGUA DISPONIBLE EN FORMA GRATUITA

Observa si en los salones de 4to y 5to hay garrafones de agua y contesta las siguientes preguntas

28. Grupos que cuentan con garrafones (Marca con una X)

<table>
<thead>
<tr>
<th>4to A</th>
<th>4to B</th>
<th>4to C</th>
<th>5to A</th>
<th>5to B</th>
<th>5to C</th>
<th>Ninguno</th>
</tr>
</thead>
<tbody>
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<td>Fin del formato</td>
</tr>
</tbody>
</table>

29. Garrafones que cuentan con agua

<table>
<thead>
<tr>
<th>4to A</th>
<th>4to B</th>
<th>4to C</th>
<th>5to A</th>
<th>5to B</th>
<th>5to C</th>
<th>Ninguno</th>
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</table>

30. Garrafones funcionales

<table>
<thead>
<tr>
<th>4to A</th>
<th>4to B</th>
<th>4to C</th>
<th>5to A</th>
<th>5to B</th>
<th>5to C</th>
<th>Ninguno</th>
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</table>

31. ¿Con que se sirven el agua?
   j. Conos
   k. Cilindro
   l. Vasos de plástico
   m. Otro __________________________

32. Condiciones de higiene de los garrafones
   n. Con basura alrededor
   o. Roto
   p. Otro __________________________

33. Total de garrafones (4to y 5to) ___

34. Total de garrafones con agua ___

35. Total de garrafones funcionales ___

Observaciones
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
<table>
<thead>
<tr>
<th>No. de puest</th>
<th>Producto</th>
<th>Lunes</th>
<th>Miércoles</th>
<th>Viernes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cantidad Inicial</td>
<td>Canti</td>
<td>Diferencia</td>
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<td>Canti</td>
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INSTITUTO NACIONAL DE SALUD PÚBLICA
CENTRO DE INVESTIGACIÓN EN NUTRICIÓN Y SALUD

“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

OBSERVACION DE INSTALACIONES Y MATERIAL PARA ACTIVIDAD FISICA

FICHA DE IDENTIFICACIÓN

6. Tipo de formulario   ___|___|   2. Código del observador   ___|___|

3. Nombre de la escuela ____________________________________________________

4. Código de la escuela   ___|___|

5. Fecha de observación ___|___|___|___|   Día    Mes   Año


OBSERVACION

7. ¿Hay juegos pintados en el patio(s)?
   a. Si
   b. No pase a la pregunta 9

8. ¿Qué tipo de juegos están pintados?
   a. Avión
   b. Stop
   c. Caracol
   d. Cuadro
   e. Otro _______________________

9. ¿Hay basura tirada en el patio?
   a. Si
   b. No

10. ¿Las paredes están pintadas con algún mensaje relacionado a la alimentación o a la actividad física o existe algún periódico mural?
    a. Si
    b. No pase a la pregunta 12

11. ¿Qué dicen los mensajes?
    a. ____________________________________________________________
    b. ____________________________________________________________
c. ______________________________________________________________________
d. ______________________________________________________________________
e. ______________________________________________________________________
f. ______________________________________________________________________
g. ______________________________________________________________________

12. Número de patios de la escuela _____________

13. ¿Qué contienen los patios: (marca con una X)

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<thead>
<tr>
<th></th>
<th>Patio 1</th>
<th>Patio 2</th>
<th>Patio 3</th>
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<tbody>
<tr>
<td>a. bancas</td>
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<tr>
<td>b. canchas</td>
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<td>c. porterías</td>
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<tr>
<td>d. redes</td>
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<td>e. canastas de basketbol</td>
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<tr>
<td>f. juegos pintados en el piso</td>
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<tr>
<td>g. juegos (carrusel, etc)</td>
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<tr>
<td>h. Otros (especificar)</td>
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</table>
14. ¿Con qué materiales y equipo cuenta la caja de patio?

<table>
<thead>
<tr>
<th>Material</th>
<th>Cantidad</th>
<th>Observaciones</th>
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Appendix B

MANUSCRIPT 2
Sample selection; randomization report; consent letters for students and questionnaires.
Selección de la muestra

En el estudio habrá 3 grupos, dos de intervención y uno de control, los grupos “intervención 1 e intervención 2” estarán constituidos por 8 escuelas como máximo, considerando que el coeficiente de Correlación Intra Clase (ICC por su siglas en inglés), observado en variables como IMC, talla y peso, en la fase formativa, no fue mayor a 0.076, por lo que no se pierde mucha eficiencia al tener pocos conglomerados con mayor número de niños en cada uno. Y para aumentar precisión, el grupo control tendrá un mayor número de escuelas (12 escuelas máximo).

La selección de las escuelas y conformación de los grupos se hará en tres fases, en la primera fase, serán seleccionadas en forma aleatoria, 18 escuelas de las listas proporcionadas por la Secretaría de Educación Pública (SEP), y que cumplen con los criterios de inclusión, para lo cual se utilizará la rutina simple de STATA. Al conjunto de 18 escuelas seleccionadas, se incorporarán 10 de las escuelas previamente seleccionadas en la fase formativa. Cabe mencionar que estas escuelas fueron seleccionadas con los mismos criterios del mismo marco muestral y en ellas solo se realizaron observaciones, no hubo ningún tipo de intervención.

En la segunda fase, del conjunto de 28 escuelas seleccionadas, serán seleccionados tres subgrupos de 8 escuelas mediante la rutina “sample” de STATA, y se les asignará en forma aleatoria, mediante números aleatorios generados en Excel, el grupo uno (Intervención 1), dos (Intervención 2) o tres (Control), al grupo seleccionado como control se le añadirán las 4 escuelas restantes para completar las 12 escuelas control.

Tamaño de la muestra

Para el cálculo de tamaño de la muestra, se generaron tablas para observar las diferencias máximas detectables según el número de niños por escuela (15, 20, 25, 30, 40 y 50) y el número de escuelas (6, 8 y 12). Las diferencias detectables se corrigieron por la no independencia de las muestras al interior de las escuelas o ICC el número de niños por escuela y el número de escuelas máximo.

Para la estimación de ICC y las diferencias de medias se utilizó las fórmulas propuesta por Murray (1) y (2), 1998, donde:

\[ \text{DEFF} = \text{efecto del diseño, y el cual se calculo mediante las rutinas del módulo SVY de STATA para las variables talla (metros), peso (kilogramos) e IMC (kilogramos/metros}^2) \text{ obtenidos en 12 escuelas observadas en la fase formativa. Para los valores de variables obtenidas de la literatura, en las que no se tiene información respecto al ICC esperado, se consideraron tres posibilidades para la ICC (0.05, 0.1 y 2).} \]

“m” = número promedio de niños por escuela.
\[ \sigma = \text{Desviación estándar de las variables obtenida como una muestra aleatoria simple.} \]
\[ z_{a/2} = \text{Valor de Z para una probabilidad de error del 0.05 con dos colas (1.96)} \]
\[ z_{\beta} = \text{Valor de Z para un poder del 80% (0.84)} \]
g = número de conglomerados (12 escuelas)

\[
ICC = \frac{DEFF \ - \ 1}{m - 1} \quad (1)
\]

\[
\Delta^* = \sqrt{\frac{2\sigma^2(1 + (m - 1)ICC)\left(z_{a/2} + z_{\beta}\right)^2}{mg}} \quad (2)
\]

Para observar diferencias entre proporciones se despeja la fórmula para el tamaño de muestra para diferencias de proporciones en dos poblaciones, la diferencia \((P_1 - P_2)\) y se corrigió por el coeficiente de ICC, donde:

\[
P = \text{promedio de } P_1 \text{ y } P_2
\]

\(P_1 \text{ y } P_2\) = proporciones esperadas para cada grupo

\[
P_1 - P_2 = \sqrt{\frac{\left(z_{a/2} \cdot \sqrt{(2P(1-P) + z_{\beta} \cdot \sqrt{P_1(1-P_1) + P_2(1-P_2)})^2 \cdot (1 + (m - 1)ICC)}}{mg}} \quad (3)
\]

De la tabla 1 se observa que se toman 8 escuelas y 30 niños por escuelas, se tendría una muestra para cada grupo intervención de 240 niños y para el grupo control de 360 niños, suficiente para detectar una diferencia entre grupos de 1.85 unidades de IMC; diferencias en 4 cm de talla; una diferencia de 1.11 horas de diferencia en tiempo dedicado a ver TV, considerando una ICC de 0.1; una diferencia en 0.45 horas dedicadas a la actividad vigorosa; una diferencia en 0.30 horas dedicadas a la actividad moderada y una diferencia de 0.30 horas dedicadas a inactividad.

Al calcular las diferencias esperadas para dos proporciones, considerando un ICC de 0.1 y una prevalencia esperada de 5%, tomando 8 escuelas y 30 niños por escuela (Tabla2), se observa que, la mínima diferencia en las proporciones es de 12.6 puntos porcentuales. Sin embargo cuando la prevalencia esperada aumenta a 10% la diferencia máxima detectable aumenta a 14.3, hasta alcanzar una diferencia mínima detectable de 22.5 puntos porcentuales cuando la prevalencia esperada es del 40%.

Si se considera un muestreo aleatorio simple (al no corregir por ICC), bajo las mismas condiciones descritas en el párrafo anterior (una prevalencia esperada de 5%, tomando 8 escuelas y 30 niños por escuela) se observa que la mínima diferencia observable es de 6.4 puntos porcentuales y esta aumenta hasta 12.8 puntos porcentuales, cuando la prevalencia esperada es del 40% (Tabla3).
Conclusiones

Al observar los cuadros se observa que la mayor eficiencia se tiene cuando son seleccionadas un número mayor de escuelas, sin embargo por costos de la implementación de la intervención en las escuelas, el número máximo de estas escuelas será 8.

El número total de estudiantes para cada grupo Intervención, será de 240 y para el grupo Control, será de 360, teniendo 30 alumnos por escuela como máximo.

El cálculo de la muestra es muy conservador, ya que esta basado en las diferencias esperadas entre grupos y no en el cambio esperado en el mismo sujeto de estudio al ser un estudio longitudinal, por lo que se espera que los cambios posibles a observar sean menores.

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Tabla 3. Tamaños de muestra, según las diferencias esperadas considerando un muestreo aleatorio simple.

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|          | Prevalencia 30 |                |                |                |               |
|          | 5 pp          | 10 pp          | 15 pp          | 5 pp           | 10 pp         |
|          | 30% 35% 33%   | 30% 40% 35%    | 30% 45% 38%    | 17.1 14.8 13.3 | 18.2 15.7 14.1|
|          | 17.4 15.1 13.5| 17.7 15.3 13.7 | 18.3 15.8 14.1 | 18.3 15.8 14.2 | 18.3 15.8 14.2|
|          | 12.1 10.5 9.4 | 12.3 10.7 9.5  | 12.9 11.2 10.0 | 12.9 11.2 10.0 | 12.9 11.2 10.0|
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|          | 15 pp         |                |                |                |               |
|          | 30% 45% 38%   |                |                |                |               |
|          | 17.7 15.3 13.7 |                |                |                |               |
|          | 9.9           |                |                |                |               |

|          | Prevalencia 40 |                |                |                |               |
|          | 5 pp          | 10 pp          | 15 pp          | 5 pp           | 10 pp         |
|          | 40% 45% 43%   | 40% 50% 45%    | 40% 55% 48%    | 18.2 15.7 14.1 | 18.3 15.8 14.1|
|          | 18.3 15.8 14.2| 18.3 15.8 14.2 | 18.3 15.8 14.2 | 18.3 15.8 14.2 | 18.3 15.8 14.2|
|          | 12.6 11.1 9.9 | 12.9 11.2 10.0 | 12.9 11.2 10.0 | 12.9 11.2 10.0 | 12.9 11.2 10.0|

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Selección de la Muestra

El estudio se realizó en 27 escuelas del Sur de la Ciudad de México, las cuales fueron seleccionadas aleatoriamente de una lista, proporcionada por la SEP, de escuelas que cumplieran con las siguientes características:

- Clasificadas como de estrato socioeconómico C- (medio bajo) o D+ (bajo alto)
- Horario matutino (8 am a 12 pm)
- Beneficiarias del Programa de Desayunos Escolares del DIF
- Población de al menos 300 alumnos a nivel primaria (2 ó más grupos por grado)
- Área para realizar actividad física comparable en tamaño y características
- Contaban con una caja de patio (de material y equipo deportivo)

Estas escuelas fueron asignadas de manera aleatoria como intervención (n=16) o control (n=11). A su vez las escuelas intervención fueron divididas en dos: 8 escuelas “básicas” en las cuales las modificaciones se implementarían únicamente mediante ajustes normativos sin la inversión de recursos y 8 escuelas “plus” en las cuales además de los cambios normativos y de organización se invertirían recursos materiales y humanos.

Con el objetivo de evaluar la intervención se seleccionó una muestra representativa de niños de 4º y 5º grado provenientes de las 27 escuelas. El procedimiento de selección se describe a continuación:

1. Se definió el número de niños que era necesario incluir para alcanzar una representatividad por escuela y por nivel de intervención (control, básicas y plus). Al cual se le aumentó un 10% previniendo posibles pérdidas

2. Se explicó detalladamente a todos los niños de 4º y 5º de las 27 escuelas y a sus padres en qué consistía el estudio y las implicaciones de participar en el mismo. Se repartieron a todos los padres de familia cartas de consentimiento informadas y se registraron los números de lista (asignados por la escuela) de los niños cuyos padres firmaron la carta de consentimiento y que accedieron de manera oral a participar en el estudio

3. Se generó una lista de números aleatorios por escuela. Mediante esta lista, en relación con el número de identificación del niño asignado por la escuela, se seleccionó la muestra que participaría en el estudio.

4. Con el fin de que la muestra fuera representativa de los diferentes salones y grados, primero se dividió el total de niños a seleccionar entre 2, la mitad se seleccionaría de 4º y la mitad de 5º. Esta media muestra posteriormente se dividió entre el total de grupos de 4º y 5º de cada escuela para incluir un número similar de niños de cada uno de ellos.

Finalmente, mediante esta metodología se seleccionó una muestra total inicial de 896 niños, entre 21 y 46 por escuela (en los niveles plus y básico fue necesario incluir una mayor cantidad de niños por escuela que en el control ya que son menos escuelas en esos niveles). La distribución de la muestra en los diferentes niveles por sexo, grado y nivel de intervención se describe en la tabla 1.

Tabla 1: Características de la muestra inicial

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Dependiendo de las características y objetivos de los instrumentos estos se aplicaron a diferentes niveles. Es decir, algunos de ellos tienen como unidad de estudio la escuela, otros un grupo y otros al niño. Además para algunos instrumentos fue necesario seleccionar submuestras debido a sus características o a la imposibilidad de aplicarlo a todos los niños. En la tabla 2 se muestra cada instrumento de la evaluación de acuerdo con su unidad de estudio, así como la muestra en la que se aplicaría.

<p>| Tabla 2: Diferentes instrumentos por unidad de estudio |
|--------------------------------|----------------|----------------|----------------|
| Niño                          | Grupo          | Escuela        |                |
| Instrumento                  | n              | Instrumento    | n              | Instrumento | n              |
| <strong>Actividad Física</strong>         |                |                |                |
| Pruebas de condición física  | 896            | SOFIT*         | 27 clases      | SOFIT*      | 27 recreos     |
| SOFIT*                       | 108            |                |                |             |                |
| Acelerómetros                | 176            |                |                |             |                |
| Podómetros                   | 896            |                |                |             |                |
| <strong>Alimentación</strong>             |                |                |                |
| Lunch de los escolares       | 432 (16 por escuela) | No existen instrumentos con grupo como unidad | Inventario de alimentos y bebidas | 81 (3 por escuela) |
| <strong>Antropometría</strong>            |                |                |                |
| Peso                         | 896            | No existen instrumentos con grupo como unidad | No existen instrumentos con la escuela como unidad |
| Estatura                     | 896            |                |                |                |
| Pliegues cutáneos            | 896            |                |                |                |
| <strong>Cualitativos</strong>             |                |                |                |
| Intencionalidad              | 896            | Observación de consumo en el salón | 54 (2 por escuela) | Observación de compra a la entrada | 54 (2 por escuela) |</p>
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<tr>
<th></th>
<th>Observación de desayuno escolar</th>
<th>81 (3 por escuela)</th>
<th>Observación de Recreo</th>
<th>54 (2 por escuela)</th>
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*SOFIT se incluyó en las 3 unidades de estudio ya que permite conocer la actividad física del niño pero también el contexto y la calidad de la clase por grupo, así como la dinámica del recreo que incluye a toda la escuela.*

Asimismo, el proceso de selección de las submuestras varió de acuerdo con los objetivos y las características de cada instrumento. A continuación se describen los procedimientos que se llevaron a cabo para seleccionar las submuestras para cada instrumento.

a) Acelerómetros:
- Fue necesario seleccionar una submuestra de acelerómetros debido a que sólo se contaba con 20 aparatos, los cuales se dividieron entre las 3 escuelas que se evaluarían semanalmente. Además se debían concentrar en un mismo grupo al menos 4 aparatos para poder realizar las observaciones de SOFIT, por lo que se llevó a cabo un sorteo para determinar si sería en un grupo de 4º o en uno de 5º en el que se empezarían a colocar los acelerómetros, en la mitad de las escuelas se inició con 4º y en la mitad con 5º. Para la selección se le dio prioridad a los grupos cuya nomenclatura empezaba con A. Por ejemplo si en la escuela 2 se iban a colocar 7 aparatos y en el sorteo se determinaba que se debían colocar a 4º, los aparatos se colocarían preferentemente a niños del grupo 4º A y en caso de que sobraran o el grupo correspondiente no asistiera se proseguiría con el grupo B y finalmente con el C. Mientras tanto cuando en un mismo grupo hubiera más niños que aparatos estos se asignarían en el orden que los niños habían sido seleccionados de acuerdo con la lista de números aleatorios.

b) SOFIT:
- Se seleccionaron 4 niños por escuela a partir de la submuestra de acelerómetros. En caso de que en un mismo grupo hubiera más de 4 niños con acelerómetro se incluyan los primeros en haber sido seleccionados mediante la lista de números aleatorios. Mientras que si en un mismo grupo no se completaran 4 acelerómetros (si los niños faltaran u olvidaran el aparato) se incluirían niños de la muestra general (los cuales debían contar con podómetro) dando prioridad a los primeros en ser seleccionados mediante los números aleatorios.

c) Lunchs:
- Se seleccionó una submuestra de 15 niños por escuela para aplicar la encuesta de lunch, por la imposibilidad de observar a la totalidad de la muestra durante el recreo. Esto se llevó a cabo de la siguiente manera: primero se incluyeron todos los niños de la submuestra de acelerómetros, después partiendo del grupo prioritario de acelerómetros (previamente establecido por sorteo) se seleccionaban los números pares o nones consecutivos dependiendo del resultado de un volado (en el cual “águila” era par y sol “non”) siempre siguiendo un orden ascendente en la nomenclatura, al final se incluían niños de todos los grupos de 4º y 5º.

d) Instrumentos a aplicar por grupo:
- Para seleccionar los grupos en los cuales se llevarían a cabo las observaciones se llevó a cabo un sorteo en el cual todos los grupos de una misma escuela tenían igual posibilidad de ser seleccionados. En cada escuela se seleccionó al menos un grupo de 4º y uno de 5º para ser observado.

Durante la evaluación y el periodo de intervención la muestra inicial sufrió algunas pérdidas y reducciones. La muestra total de 896 niños se redujo a 858, lo cual representa una
pérdida del 4%. Los niños se dieron de baja del estudio principalmente por cambio de escuela o enfermedades infecciosas que afectaban su estado de nutrición o condición física. En la tabla 3 se describe la muestra que se permaneció durante todo el estudio (evaluación basal, intervención y evaluación final), así como el porcentaje de pérdida con respecto a la muestra inicial (el cual se presenta entre paréntesis).

<table>
<thead>
<tr>
<th>Tabla 3: Características de la muestra final</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4ª</strong></td>
</tr>
<tr>
<td><strong>Básicas</strong></td>
</tr>
<tr>
<td>Niños</td>
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<tr>
<td>Niñas</td>
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<tr>
<td>Total</td>
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<td><strong>Plus</strong></td>
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<td>Niños</td>
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<td>Niñas</td>
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<tr>
<td>Total</td>
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<td><strong>Control</strong></td>
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<tr>
<td>Niños</td>
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<tr>
<td>Niñas</td>
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<tr>
<td>Total</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
</tr>
</tbody>
</table>

De igual forma la muestra inicial de los instrumentos que tienen como unidad de estudio la escuela o un grupo, así como las submuestras se redujeron con respecto a la muestra inicial y en la evaluación final. La Tabla 4 muestra un comparativo entre la muestra inicial y las muestras reales de la evaluación basal y final.

<table>
<thead>
<tr>
<th>Tabla 4: Comparación entre la muestra inicial y las de la evaluación basal y final</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instrumento</strong></td>
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<tr>
<td>Pruebas de condición física</td>
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<tr>
<td>SOFIT</td>
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<tr>
<td>Acelerómetros</td>
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<tr>
<td>Podómetros</td>
</tr>
<tr>
<td>Lunch de los escolares</td>
</tr>
<tr>
<td>Antropometría</td>
</tr>
<tr>
<td>Intencionalidad</td>
</tr>
<tr>
<td>Inventario de material y equipo deportivo</td>
</tr>
<tr>
<td>Inventario de alimentos</td>
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<tr>
<td>Observación del desayuno escolar</td>
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<tr>
<td>Observación del consumo en el salón</td>
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<tr>
<td>Observación del recreo</td>
</tr>
<tr>
<td>Observación de compra a la entrada</td>
</tr>
</tbody>
</table>
Septiembre 2007

CARTA DE CONSENTIMIENTO: Consentimiento de los Padres para que su hijo(a) Participe en una entrevista y Aceptación de su Hijo(a) para participar.

PROMOCIÓN DE ACTIVIDAD FÍSICA ADECUADA Y ALIMENTACIÓN SALUDABLE EN EL SISTEMA EDUCATIVO MEXICANO PARA LA PREVENCIÓN DE OBESIDAD INFANTIL

Estimado Señor / Señora:

Introducción/Objetivo:
En nombre del Instituto Nacional de Salud Pública y la Secretaría de Educación Pública le extendemos una cordial invitación para participar en un estudio que tiene como propósito la implementación y evaluación de una estrategia que modifique el medio ambiente de los escolares con el objeto de promover la actividad física adecuada y alimentación saludable de los mismos, mejorando así su composición corporal y su aptitud física.

Procedimiento:
Si acepta participar en el estudio se le harán una serie de preguntas confidenciales relacionadas con la alimentación de su hijo(a), se harán observaciones durante la clase de educación física, observaciones sobre los alimentos que su hijo consume en la escuela, mediciones antropométricas (peso, talla, pliegues), y una prueba de aptitud física: flexibilidad, capacidad aeróbica (se le pide al niño que corra durante 9 minutos, hasta donde pueda) y fuerza (se le pide al niño que realice algunas lagartijas). Las observaciones, entrevistas y mediciones serán realizadas por personal capacitado por el INSP.

Tardaremos en formularle estas preguntas aproximadamente media hora, las mediciones antropométricas se estima realizarlas en 5 minutos, y la prueba de aptitud física será de aproximadamente 20 minutos. Estas mediciones se realizaran en 6 ocasiones a lo largo de todo el proyecto (año y medio). Si usted decide participar, estará colaborando con el Instituto Nacional de Salud Pública y la Secretaría de Educación Pública en nuestra misión de mejorar la educación y los servicios que se proporcionan a los niños.

Beneficios:
Si Usted y su hijo(a) están de acuerdo en participar, estará ayudando al Instituto Nacional de Salud Pública en su misión de investigar y encontrar soluciones con la finalidad de promover una actividad física adecuada y una alimentación saludable para mejorar la composición corporal y la aptitud física de los niños que asisten a las escuelas.

Participación /Retiro Voluntario:
Los niños que participen en este estudio serán aquellos que estén cursando los grados de 5º y 6º grado. La participación en el estudio es totalmente voluntaria. Usted tiene el derecho a negarse a participar y abandonar en cualquier momento el estudio. El hecho de participar o no participar no afecta en nada los beneficios que el niño recibe de parte de la escuela ni ningún otro beneficio futuro.

Confidencialidad:
La información que obtendremos será completamente confidencial, se transportará directamente al Instituto Nacional de Salud Pública, a la oficina del Dr. Juan Rivera, y será de uso exclusivo de los investigadores participantes de este proyecto.

Contactos:
Usted tiene el derecho de recibir respuesta a cualquier pregunta acerca de los procedimientos, riesgos y beneficios relacionados con este proyecto. Para ello puede comunicarse con la Maestra Margarita Safdie, responsable del mismo, al teléfono 24 75 84 54 o al 54 87 10 27.

Consentimiento de los Padres o Tutor Para la participación de su Hijo (a)

Su firma indica su aceptación a que su hijo (a) participe voluntariamente en el presente estudio.

Nombre del Padre/Madre/Tutor del participante: _________________________________
Fecha: __________________________________________________

Día / Mes / Año

Firma: _________________________________

Parentesco con el niño (a): _________________________________
Aceptaración del Menor a Participar

(Se obtendrá de manera oral cuando se entreviste al menor)

Nombre del niño(a):

Se le ha explicado al niño(a), y ha aceptado participar:

1. Sí  
2. No  

Fecha: ___________________  Día / Mes / Año

Testigo #1:  
Parentesco con el menor participante: ___________________
Fecha: ___________________  Día / Mes / Año

Testigo #2:  
Parentesco con el menor participante: ___________________
Fecha: ___________________  Día / Mes / Año

Nombre y firma del investigador que obtiene el consentimiento:

_______________________________

Atentamente

____________________
Mtra. Margarita Safdie
Coordinadora del proyecto
Centro de investigaciones en Nutrición y Salud
Departamento de nutrición de comunidades
INSTITUTO NACIONAL DE SALUD PÚBLICA  
CENTRO DE INVESTIGACIÓN EN NUTRICIÓN Y SALUD  

“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

--ACTIVACION--

<table>
<thead>
<tr>
<th>FICHA DE IDENTIFICACIÓN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nombre de la escuela ________________________________________________</td>
</tr>
<tr>
<td>2. Código de la escuela</td>
</tr>
<tr>
<td>3. Fecha de observación</td>
</tr>
<tr>
<td>Día  Mes  Año</td>
</tr>
<tr>
<td>4. Código del observador</td>
</tr>
<tr>
<td>5. Etapa de estudio</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DATOS GENERALES DE LA ESCUELA</th>
</tr>
</thead>
<tbody>
<tr>
<td>6. No. De grupos de 1º a 4º</td>
</tr>
<tr>
<td>7. No de grupos de 5º y 6º</td>
</tr>
<tr>
<td>8. Total de grupos en la escuela</td>
</tr>
<tr>
<td>9. Numero total de alumnos en la escuela</td>
</tr>
<tr>
<td>10. Total de profesores de educación física en la escuela</td>
</tr>
<tr>
<td>11. ¿Cuántas clases de educación física tienen a la semana los grupos de 5º?</td>
</tr>
<tr>
<td>12. ¿Cuántas clases de educación física tienen a la semana los grupos de 6º?</td>
</tr>
<tr>
<td>13. ¿Cuántos minutos dura cada clase de educación física?</td>
</tr>
</tbody>
</table>
ACTIVACIÓN

14. ¿Se da activación en la escuela?
   1) Si
   2) No (pase a la pregunta 22)

15. ¿Cuál es el horario de la activación? __:__ a __:__

16. ¿Cuánto dura la activación? __ minutos

17. ¿Que grupos participan en la activación? (marca la opción que corresponda)

18. ¿Cuántos niños realizaron en la activación?
   a) Todos
   b) Mas de la mitad
   c) La mitad o menos de la mitad
   d) Ninguno

19. ¿Estuvieron presentes los maestros de grupo durante la activación?
   1) Si
   2) No (pasa a la pregunta 22)

20. ¿Realizaron la activación los maestros de grupo?
   1) Si
   2) No (pasa a la pregunta 22)

21. ¿De que grupos? (marca la opción que corresponda)

22. ¿Cuántas veces de esta semana se ha dado activación? __

EDUCACIÓN FISICA (PREGUNTAS PARA EL PROFESOR DE EDUCACIÓN FISICA)

23. ¿Cuál es el objetivo, desde su punto de vista, de la clase de Educación física?
   a) Entrenar a los niños en habilidades deportivas
   b) Promover estilos de vida saludables
   c) Apoyar el desarrollo psicomotor de los niños
   d) Prevenir enfermedades
   e) Motivar a los niños
   f) Identificar talentos
   g) Otro:______________________________

24. ¿Todos los niños tienen las mismas aptitudes deportivas dentro de la clase de EF?
   1) Si (pase a la pregunta 44)
   2) No

25. ¿Qué hacen los niños que NO tienen aptitudes deportivas dentro de la clase de EF?
   a) Intentan seguir la clase mostrando entusiasmo
   b) Intentan seguir la clase por obligación
   c) Muestran apatía y no siguen la clase
d) Buscan otras actividades
  e) Inventan pretextos para no realizar las actividades de la clase

26. ¿Usted se siente motivado a dar la clase de educación física?
   1) Si
   2) No, ¿Por qué?___________________________________________

27. ¿Con qué frecuencia se realizan las siguientes actividades durante la clase de educación física? (marca la opción que corresponda)

<table>
<thead>
<tr>
<th>FRECUENCIA</th>
<th>INICIO DE CLASE</th>
<th>TERMINO DE CLASE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Calentamiento</td>
<td>Estiramiento</td>
</tr>
</tbody>
</table>

28. ¿Cuáles son las actividades que se realizan en la clase de EF?
   a) Acondicionamiento físico
   b) Habilidades
   c) Estiramiento
   d) Coordinación motora
   e) Ejercicios de lateralidad y espacio
   f) Deporte Organizado (Fútbol, básquetbol, voleibol)
   g) Brincar, Saltar la reata
   h) Otros juegos

29. ¿Se utiliza algún material deportivo en la clase de educación física?
   1) Si, ¿Cuál?___________________________________________
   2) No (pase a la pregunta 49)

30. ¿Hay suficiente material para todos?
   1) Si
   2) No
31. ¿Qué es lo que más les gusta hacer a los niños dentro de la clase de educación física?

<table>
<thead>
<tr>
<th>ACTIVIDADES</th>
<th>NINOS</th>
<th>NINAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Correr</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>b) Brincar</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>c) Saltar la cuerda</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>d) Fútbol</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>e) Básquetbol</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>f) Voleibol</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>g) Ejercicios de acondicionamiento</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>h) Tiempo libre</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>i) Sentarse</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>j) Jugar con pelotas</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
<tr>
<td>k) Otros(especificar)</td>
<td>1. Sí</td>
<td>2. No</td>
</tr>
</tbody>
</table>

Observaciones:___________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

COMPRA EN EL RECREO DE LOS ESCOLARES

FICHA DE IDENTIFICACIÓN

3. Tipo de formulario |__|__|  2. Código del observador |__|__|

34. Nombre de la escuela __________________________________________________

35. Código de la escuela |__|__|

36. Nombre del niño_______________________________________________________

37. Folio del niño |__|__|__|__|__|  7. Fecha de observación |__|__|__|__|__|__|
   Día
   Mes   Año

38. Grado y Grupo |__|__|


COMPRA DE LOS ESCOLARES ENCUESTA

40. ¿Cuánto dinero te dan al día aproximadamente? |__|__|__| . |__|__|

41. ¿Te gastas todo el dinero que te mandan en el recreo?
   3. Sí pregunta 12
   4. No

42. ¿Qué haces con el dinero que te sobra?
   6. Lo guardo para el siguiente día
   7. Lo ahorro
   8. Compro algún alimento o bebida en la salida
   9. Se lo regreso a mi mamá
   10. Otro ____________________________________________

43. ¿Qué prefieres traer a la escuela dinero para comprar en el recreo o lunch?
   4. Dinero
   5. Lunch
   6. Ambos
44. Que bebida tomas en la escuela (seleccionar la más frecuente, mas de 3 veces a la semana)

1. Agua natural
2. Agua de fruta sin azúcar
3. Agua de fruta con azúcar
4. Agua industrializada con azúcar
5. Agua industrializada sin azúcar
6. Jugo Natural
7. Jugo industrializado (jugo del valle, ami, boing)
8. Leche saborizada
9. Leche natural
10. Bebidas de Soya
11. Bebidas deportivas
12. Té
13. Refresco
14. Otro
15. Ninguna
45. Registra la cantidad de dinero que trajo para gastar en el recreo [___] [___] [___] [___]

46. Observa lo que compra el niño durante el recreo y lo que se come y regístralo en la tabla.

<table>
<thead>
<tr>
<th>1. Alimento</th>
<th>1. Permitido</th>
<th>Código del alimento</th>
<th>Nombre del alimento</th>
<th>Equivalentes/unidad</th>
<th>g</th>
<th>Cantidad consumida</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>1. Nada</td>
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<td>2. Menos de la mitad</td>
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<td>3. La mitad</td>
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<td>4. Más de la mitad</td>
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<td>5. Todo</td>
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|   |   |   |   |   |   |   |
|   |   |   |   |   |   |   |
47. De acuerdo a lo observado, anota la cantidad de Fruta y Verdura que compró en el recreo (gramos total) _____

48. Ingredientes de los alimentos comprados
Desglosa los ingredientes y los pesos de cada uno de los alimentos que trae el niño

<table>
<thead>
<tr>
<th>Preparación</th>
<th>Código del alimento</th>
<th>Nombre</th>
<th>Cantidad (piezas, unidades, medidas)</th>
<th>Gramos</th>
</tr>
</thead>
<tbody>
<tr>
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</table>
49. Actividades que realizó durante el recreo. Puedes seleccionar mas de una opción
   f. Comió
   g. Corrió
   h. Jugo
   i. Caminó
   j. Se sentó
   k. Otro____________________

50. ¿A que hora comió los alimentos? Una sola opción
   e. 1ros 15 minutos
   f. 2dos 15 minitos
   g. Ambos
   h. No comió Fin del cuestionario

Observaciones
____________________________________________________________________________________________________________________
____________________________________________________________________________________________________________________
____________________________________________________________________________________________________________________
____________________________________________________________________________________________________________________
____________________________________________________________________________________________________________________
Promocion de actividad fisica adecuada y alimentacion saludable en el sistema educativo mexicano para la prevencion de obesidad infantil

-- CUANTITATIVO --

INVENTARIO DE AGUA

FICHA DE IDENTIFICACION

2. Tipo de formulario |   |

2. Código del observador |   |

11. Nombre de la escuela

12. Código de la escuela |   |

13. Fecha de observación |   | |   |

   Día   Mes   Año


INVENTARIO DE BEBEDEROS O AGUA DISPONIBLE EN FORMA GRATUITA

Describe las caracteristicas de los contenedores de agua gratuita.

36. Total de grupos de 5o y 6º en las escuelas |   |
37. ¿Hay bebederos en la escuela?
   e. Sí
   f. No pregunta 23

38. No. de bebederos [______]

39. Cuantos funcionan [______]

40. Condiciones de higiene de los bebederos
   a. Limpio
   b. Con hojas de árbol
   c. Con polvo
   d. Con basura
   e. Oxidados
   f. Rotos

41. Ubicación_________________________________

<table>
<thead>
<tr>
<th>GARRAFONES DE ÁREAS COMUNES</th>
</tr>
</thead>
</table>

42. ¿Hay garrafones de agua disponibles para los niños en el patio?
   a. Sí
   b. No pase pregunta 27 A

43. No de garrafones [______]

44. Cuantos funcionan [______]

45. Condiciones de higiene de los garrafones
   a. Limpio
   b. Rotos
   c. Con polvo
   d. Con basura
   e. Otro_____________________________________
### GARRAFONES PARA GRUPOS DE 5º Y 6º

Observa si en los salones de **5o y 6o** hay garrafones de agua y contesta las siguientes preguntas

46. Grupos que cuentan con garrafones (Marca con una X)

<table>
<thead>
<tr>
<th>5º A</th>
<th>5º B</th>
<th>5º C</th>
<th>5º D</th>
<th>6º A</th>
<th>6º B</th>
<th>6º C</th>
<th>6º D</th>
<th>Ninguno</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<td></td>
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<td>Fin del formato</td>
</tr>
</tbody>
</table>

47. Garrafones que cuentan con agua

<table>
<thead>
<tr>
<th>5º A</th>
<th>5º B</th>
<th>5º C</th>
<th>5º D</th>
<th>6º A</th>
<th>6º B</th>
<th>6º C</th>
<th>6º D</th>
<th>Ninguno</th>
</tr>
</thead>
<tbody>
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<td></td>
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<td></td>
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</tbody>
</table>

48. Garrafones funcionales

<table>
<thead>
<tr>
<th>5º A</th>
<th>5º B</th>
<th>5º C</th>
<th>5º D</th>
<th>6º A</th>
<th>6º B</th>
<th>6º C</th>
<th>6º D</th>
<th>Ninguno</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

49. Condiciones de higiene de los garrafones
   - a. Limpio
   - b. Rotos
   - c. Con polvo
   - d. Con basura
   - e. Otro________________________

50. Total de garrafones (5º y 6º) |__|__|__|__|

51. Total de garrafones con agua |__|__|__|__|

52. Total de garrafones funcionales |__|__|__|__|

Observaciones
INSTITUTO NACIONAL DE SALUD PÚBLICA
CENTRO DE INVESTIGACIÓN EN NUTRICIÓN Y SALUD

“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

-- CUANTITATIVO --

INVENTARIO DE PUESTOS, ALIMENTOS, BEBIDAS Y AGUA

FICHA DE IDENTIFICACIÓN

1. Tipo de formulario ______ 2. Código del observador ______

3. Nombre de la escuela ____________________________________________

15. Código de la escuela ______

16. Fecha de observación ______

17. Día Mes Año

# PUESTOS DISPONIBLES

Registra los puestos observados en el recreo

<table>
<thead>
<tr>
<th>Puestos</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>11.</td>
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<td>12.</td>
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<td>18.</td>
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<td>19.</td>
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<tr>
<td>20.</td>
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</tbody>
</table>

19. No. De puestos solo de fruta y verdura [____]  
20. Numero de puestos totales en el recreo [____]

21. Numero de puestos que vendieron alimentos prohibidos [____]  
22. Numero de puestos que vendieron alimentos permitidos [____]

23. Hora en que inicia la venta __:__ hrs.  
24. Hora en que termina la venta __:__ hrs.

25. ¿Qué puestos son los más frecuentados por los niños?

<table>
<thead>
<tr>
<th>Puesto</th>
<th>No. de Puesto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ro</td>
<td></td>
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<tr>
<td>2do</td>
<td></td>
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<tr>
<td>3ro</td>
<td></td>
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</tbody>
</table>
53. Detalla el tipo de productos alimenticios que se encuentran disponibles en la cooperativa escolar.

14.4. **Frutas y verduras**

<table>
<thead>
<tr>
<th></th>
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</tbody>
</table>
ALIMENTOS DISPONIBLES

14.5. Alimentos permitidos

<table>
<thead>
<tr>
<th></th>
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</tr>
</tbody>
</table>
14.6. Alimentos no permitidos

<table>
<thead>
<tr>
<th>Código</th>
<th>Producto</th>
<th>Cantidad Inicial</th>
<th>Unidad (pza o gramos)</th>
<th>Diferencia cantidades</th>
<th>Gramos ración</th>
<th>Costo</th>
</tr>
</thead>
</table>

14.7. Dulces, boing y agua (pedir las hojas de balance de cooperativa)
OBSERVACION DE INSTALACIONES Y MATERIAL PARA ACTIVIDAD FISICA

FICHA DE IDENTIFICACIÓN

7. Tipo de formulario __|__|  2. Código del observador __|__|

15. Nombre de la escuela __________________________________________________

16. Código de la escuela __|__|

17. Fecha de observación __|__|__|__|__|__| Día Mes Año


OBSERVACION

19. ¿Hay juegos pintados en el patio(s)?
   a. Si
   b. No pase a la pregunta 9

20. ¿Qué tipo de juegos están pintados?
   f. Avión
   g. Stop
   h. Caracol
   i. Cuadro
   j. Otro _______________________

21. ¿Hay basura tirada en el patio?
   c. Si
   d. No

22. ¿Las paredes están pintadas con algún mensaje relacionado a la alimentación o a la actividad física o existe algún periódico mural?
   c. Si
   d. No pase a la pregunta 12

23. ¿Qué dicen los mensajes?
   h. ____________________________________________________________
   i. ____________________________________________________________
   j. ____________________________________________________________
   k. ____________________________________________________________
24. Número de patios de la escuela __________

25. Qué contienen los patios: (marca con una X)

<table>
<thead>
<tr>
<th></th>
<th>Patio 1</th>
<th>Patio 2</th>
<th>Patio 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. bancas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. canchas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>k. porterías</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>l. redes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>m. canastas de basketbol</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n. juegos pintados en el piso</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>o. juegos (carrusel, etc)</td>
<td></td>
<td></td>
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<tr>
<td>p. Otros (especificar)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
26. ¿Con qué materiales y equipo cuenta la caja de patio?

<table>
<thead>
<tr>
<th>Material</th>
<th>Cantidad</th>
<th>Observaciones</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</table>
INSTITUTO NACIONAL DE SALUD PÚBLICA
CENTRO DE INVESTIGACIÓN EN NUTRICIÓN Y SALUD

“Promoción de actividad física adecuada y alimentación saludable en el sistema educativo mexicano para la prevención de obesidad infantil”

OBSERVACIÓN DE LA COMPRA DE ALIMENTOS Y BEBIDAS
A LA ENTRADA Y SALIDA DE LA ESCUELA

FICHA DE IDENTIFICACIÓN

4. Tipo de formulario |   |

2. Código del observador |   |

13. Nombre de la escuela ____________________________________________________

14. Código de la escuela |   |

15. Fecha de observación |   |   |   |   |
   Día  mes  Año


OBSERVACIÓN DE COMPRA DE ALIMENTOS Y BEBIDAS FUERA DE LA ESCUELA A LA ENTRADA

17. Número de observación |   |


19. Total de puestos de alimentos y bebidas |   |

20. Enlista los puestos de alimentos y bebidas

<table>
<thead>
<tr>
<th>Puesto</th>
<th>Codificación</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>2.</td>
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<td>3.</td>
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<tr>
<td>4.</td>
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</tr>
</tbody>
</table>
21. Anota cuales son los 3 puestos más frecuentados y los alimentos y bebidas más comprados (En orden de preferencia)

<table>
<thead>
<tr>
<th>Puesto</th>
<th>Alimentos y bebidas</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ro</td>
<td></td>
</tr>
<tr>
<td>2do</td>
<td></td>
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<tr>
<td>3ro</td>
<td></td>
</tr>
</tbody>
</table>

Observaciones
(Sucesos que llamen tu atención en referencia al consumo de alimentos y bebidas)
____________________________________________________________________________________
____________________________________________________________________________________
____________________________________________________________________________________

Hora de término de observación ___:___ hrs.
**OBSERVACIÓN DE COMPRA DE ALIMENTOS Y BEBIDAS FUERA DE LA ESCUELA A LA SALIDA**

Hora de inicio de observación __ __: __ __ hrs.

22. Total de puestos de alimentos y bebidas [___] __

23. Enlista los puestos de alimentos y bebidas

<table>
<thead>
<tr>
<th>Puesto</th>
<th>Codificación</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
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<td>7.</td>
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<td>8.</td>
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<td>9.</td>
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<tr>
<td>10</td>
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</tbody>
</table>

24. Anota cuales son los 3 puestos más frecuentados y los alimentos o bebidas más comprados (en orden de preferencia)

<table>
<thead>
<tr>
<th>Puesto (NÚMERO)</th>
<th>Alimentos y bebidas (CODIGO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1ro</td>
<td></td>
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<tr>
<td>2do</td>
<td></td>
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<tr>
<td>3ro</td>
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</tbody>
</table>

Hora de término de observación __ __: __ __ hrs.

**Observaciones**
(Sucesos que llamen tu atención en referencia al consumo de alimentos y bebidas)

____________________________________________________________________________________

____________________________________________________________________________________
### CATEGORIZACIÓN

<table>
<thead>
<tr>
<th>Alimentos industrializados con grasa</th>
<th>Alimentos industrializados con azúcar</th>
<th>Bebidas industrializadas</th>
<th>Alimentos caseros con grasa</th>
<th>POSTRES CON azúcar</th>
<th>NUEVA CATEGORIA: Fритуры</th>
<th>Alimentos saludables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ai_gr (1)</td>
<td>Ai_az (2)</td>
<td>Beb_ind (3)</td>
<td>Ac_gr (4)</td>
<td>Post (5)</td>
<td>Frit (6)</td>
<td>A_salu (6)</td>
</tr>
<tr>
<td>Totopos</td>
<td>Dulces</td>
<td>Refrescos</td>
<td>Atole</td>
<td>Papas</td>
<td>Frutas</td>
<td></td>
</tr>
<tr>
<td>Papas sabritas</td>
<td>Boing</td>
<td>Tacos dorados</td>
<td>Algodones de azúcar</td>
<td>Chicharrones</td>
<td>Verduras</td>
<td></td>
</tr>
<tr>
<td>Donas</td>
<td>Chocolates</td>
<td>Frutsi</td>
<td>Tamales</td>
<td>Chamoyadas</td>
<td>Chicharrones preparados</td>
<td>Agua natural</td>
</tr>
<tr>
<td>Cueritos</td>
<td>Galletas</td>
<td>Vida</td>
<td>Banderillas de salchicha</td>
<td>Agua de naranja</td>
<td>Palomitas</td>
<td>Yakult</td>
</tr>
<tr>
<td>Pan de dulce</td>
<td>Bon ice</td>
<td>Pizzas</td>
<td>Aguas de horchata</td>
<td>Nachos</td>
<td>Elotes</td>
<td></td>
</tr>
<tr>
<td>Danoninos</td>
<td>Paupau</td>
<td>Churros</td>
<td>Gelatina</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yogurt congelado</td>
<td>Ami</td>
<td>Sándwich</td>
<td>Helados</td>
<td></td>
<td>Habas</td>
<td></td>
</tr>
<tr>
<td>Productos marinela</td>
<td>Jumex</td>
<td>Gorditas</td>
<td>Nieves y paletas</td>
<td></td>
<td>Cacahuates</td>
<td></td>
</tr>
<tr>
<td>Yogurt para beber</td>
<td>Jugos</td>
<td>Quesadillas</td>
<td>Raspados</td>
<td></td>
<td>Pepitas</td>
<td></td>
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<td>Gatorade</td>
<td>Congeladas</td>
<td>Sopes</td>
<td>Flan</td>
<td></td>
<td>Palanquetas</td>
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<td>Leche sabor chocolate</td>
<td>Tortas</td>
<td>Pastelillos</td>
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<td></td>
<td>Leche sabor</td>
<td>Tacos de canasta</td>
<td>Agua de sabor</td>
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<td>Tacos de bistec</td>
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<td></td>
<td>Tacos de chorizo</td>
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<td></td>
<td>Empanadas</td>
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<td>Tostadas</td>
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<td></td>
<td>Sandwich</td>
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</tbody>
</table>
Appendix C

MANUSCRIPT 3
Ethics approval; letter of information and consent forms for health promotion workers; SCT questionnaire and activity reports
February 09, 2012

Ms. Margarita Safdie
Ph.D. Candidate
School of Kinesiology & Health Studies
Queen's University
28 Division Street
Kingston, ON K7L 3N6

GREB Romeo #: 6003469
Title: "GPHE-055-09 - Ecological Mapping of an Intervention Program to Prevent Childhood Obesity in the Mexican School System"

Dear Ms. Safdie:

The General Research Ethics Board (GREB) has reviewed and approved your request for renewal of ethics clearance for the above-named study. This renewal is valid for one year from January 14, 2012. Prior to the next renewal date you will be sent a reminder memo and the link to ROMEO to renew for another year.

You are reminded of your obligation to advise the GREB of any adverse event(s) that occur during this one year period. An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours. Report to GREB through either ROMEO Event Report or Adverse Event Report Form at [http://www.queensu.ca/ors/researchethics/GeneralREB/forms.htm](http://www.queensu.ca/ors/researchethics/GeneralREB/forms.htm)

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example you must report changes in study procedures or implementation of new aspects into the study procedures. Your request for protocol changes will be forwarded to the appropriate GREB reviewers and/or the GREB Chair. Please report changes to GREB through either ROMEO Event Reports or the Ethics Change Form at [http://www.queensu.ca/ors/researchethics/GeneralREB/forms.htm](http://www.queensu.ca/ors/researchethics/GeneralREB/forms.htm)

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

[Signature]

Joan Stevenson, Ph.D.
Professor and Chair
General Research Ethics Board

c.c.: Dr. Lucie Lévesque, Faculty Supervisor and Co-investigator
Juan Rivera (Executive Director, Institute of Public Health, Mexico) and Dr. Ian Janssen (Assistant Professor, SKHS), Co-investigators
Dr. Spencer Moore, Chair, Unit REB
Josie Birchall, Dept. Admin.
Estimado Colega,

Con el fin de hacer un análisis ecológico del programa de PROMOCIÓN DE ACTIVIDAD FÍSICA ADECUADA Y ALIMENTACIÓN SALUDABLE EN EL SISTEMA EDUCATIVO MEXICANO PARA LA PREVENCIÓN DE OBESIDAD INFANTIL, implementado por el INSP en escuelas públicas del DF, estamos realizando una recopilación de los datos de las intervenciones que se implementaron durante los ciclos escolares 2006-2007 y 2007-2008. Dado que tu participación en el proyecto fue muy relevante y decisiva, no nos gustaría omitir tu punto de vista y retroalimentación en la descripción y recopilación de la información de este proyecto. El objetivo es tener la información completa y reflejar el enorme esfuerzo así como la contribución de este proyecto, por eso, necesitamos de tu cooperación.

Adjunto en este correo hay un cuestionario en el cual están enlistadas las estrategias implementadas en ambos años y en las que tu pudiste participar. Te pedimos por favor que completes (marcando con una x) en cuáles de estas participaste durante la implementación. Una vez terminada esta fase de información inicial te buscaremos para que discutamos la forma de implementación de una forma en una reunión sin protocolo y de forma abierta. También solicitamos que nos proporciones tus datos para poder contactarte para más detalles. Te agradeceríamos que envíes tus datos y el cuestionario para el 15 de Mayo a lenimtz@hotmail.com y a cторres@insp.mx

De antemano agradecemos tu cooperación

Un gran abrazo

Margarita Safrdie
Leni Martinez del Campo
Catalina Torres
Selecciona la intención que tuviste detrás de las actividades que tú implementaste es decir, en tu papel de implementador cual fue tu intención al implementar tus estrategias: N=Nutrición, AF=Actividad Física,

<table>
<thead>
<tr>
<th></th>
<th>Nº</th>
<th>AF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Corregir errores conceptuales</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Influenciar actitudes de los participantes</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Desarrollar una habilidad específica en los participantes</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Reforzar cambios positivos en los participantes</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Utilizar motivación verbal</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Proveer incentivos a los participantes</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Proveer información sobre “porque, como y cuando”</td>
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<td>8.</td>
<td>Proveer incentivos para participar</td>
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<td>9.</td>
<td>Proveer información sobre “como hacer las cosas”</td>
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<td>10.</td>
<td>Promocionar aspectos tradicionales de la salud</td>
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<td>11.</td>
<td>Reflexionar sobre las tradiciones de la comunidad?</td>
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<td>12.</td>
<td>Promover el mensaje de estilos de vida saludables</td>
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<tr>
<td>13.</td>
<td>Proveer la oportunidad a os participantes de compartir</td>
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<td>14.</td>
<td>Dar la oportunidad a los participantes de compartir experiencias y conocimientos</td>
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<td>15.</td>
<td>Proveer a los participantes la oportunidad de dar retroalimentación</td>
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<tr>
<td>16.</td>
<td>Dar a los participantes la oportunidad de aprender o desempeñar una habilidad</td>
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<tr>
<td>17.</td>
<td>Crear un ambiente amigable que invite a la participación comunitaria</td>
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<td>18.</td>
<td>Influenciar el cambio de alguna política existente</td>
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<tr>
<td>19.</td>
<td>Influenciar el cambio de alguna practica o mensaje existente</td>
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<tr>
<td>20.</td>
<td>Reforzar alguna política existente</td>
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<td>21.</td>
<td>Influenciar sobre la disponibilidad de algún producto o servicio</td>
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<tr>
<td>22.</td>
<td>Influenciar sobre la accesibilidad de algún producto o servicio</td>
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<td>23.</td>
<td>Influenciar cambios en ambiente físico</td>
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<td>24.</td>
<td>Promover el uso de demostraciones personales como ejemplo</td>
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<td>25.</td>
<td>Proveer servicio y apoyo para los profesionales</td>
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¿Qué estrategias implementaste? Márcalas con una “x”.

<table>
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<tr>
<th>Año 1</th>
<th>Año 2</th>
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<tbody>
<tr>
<td>Balanceo de productos de la cooperativa</td>
<td>Balanceo de los productos de la cooperativa</td>
</tr>
<tr>
<td>Día de frutas y verduras</td>
<td>Incrementar la disponibilidad de verduras y frutas</td>
</tr>
<tr>
<td>Prohibir la venta de alimentos densamente energéticos</td>
<td>Prohibir la venta de productos densamente energéticos</td>
</tr>
<tr>
<td>Reducir la disponibilidad de dulces en la cooperativa</td>
<td>Reducir la disponibilidad de dulces</td>
</tr>
<tr>
<td>Modificar las técnicas culinarias y los ingredientes</td>
<td>Eliminar/limitar la disponibilidad de bebidas azucaradas</td>
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<tr>
<td>de los productos que se venden en la cooperativa</td>
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<tr>
<td>Eliminar/limitar la disponibilidad de bebidas azucaradas</td>
<td>Disponibilidad de agua natural</td>
</tr>
<tr>
<td>Disponibilidad de agua natural</td>
<td>Prohibir el consumo de alimentos dentro del salón de clases y promover un tiempo límite de 20 minutos para el consumo del desayuno escolar</td>
</tr>
<tr>
<td>Prohibir el consumo de alimentos dentro del salón de clases y promover un tiempo límite de 20 minutos para el consumo del desayuno escolar</td>
<td>Promover el recreo como el único momento para consumir alimentos durante la jornada escolar</td>
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<td>Promover el recreo como el único momento para consumir alimentos durante la jornada escolar</td>
<td>Recreo activo</td>
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<td>Recreo escalonado</td>
<td>Activación</td>
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<tr>
<td>Recreo activo y clases de actividades</td>
<td>50 minutos efectivos de clases de EF</td>
</tr>
<tr>
<td>Activación</td>
<td>100 minutos efectivos de clases de EF</td>
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<tr>
<td>50 minutos efectivos de clases de EF</td>
<td>Pintar el patio</td>
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<tr>
<td>100 minutos efectivos de clases de EF</td>
<td>Posters</td>
</tr>
<tr>
<td>Pintar el patio</td>
<td>Periódico mural</td>
</tr>
<tr>
<td>Nombre, slogan, imagen y concepto</td>
<td>Taller para los estudiantes: Crear un comic</td>
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</table>

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<table>
<thead>
<tr>
<th>Posters</th>
<th>Taller para los estudiantes: Nutrichef</th>
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</thead>
<tbody>
<tr>
<td>Lanzamiento del programa</td>
<td>Boletín para los padres: gaceta Nutridinamica</td>
</tr>
<tr>
<td>Folletos para los padres</td>
<td>Taller con los vendedores de la cooperativa</td>
</tr>
<tr>
<td>Folletos para los vendedores</td>
<td>Taller para los profesores de EF</td>
</tr>
<tr>
<td>Folletos para los profesores de EF</td>
<td>Taller de sensibilización para profesores</td>
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<tr>
<td>Reunión con los padres</td>
<td>Taller de capacitación para profesores de EF: activación</td>
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<tr>
<td>Taller para los profesores de EF</td>
<td>Asistencia bimestral a las juntas de consejo técnico</td>
</tr>
<tr>
<td>Taller para los vendedores</td>
<td></td>
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<tr>
<td>Taller para los alumnos: cómo preparar un lunch saludable</td>
<td></td>
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<tr>
<td>Taller para los alumnos: ingestión y gasto energético</td>
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<tr>
<td>Reconocimientos</td>
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<tr>
<td>Asistencia bimestral a las juntas de consejo técnico</td>
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</tbody>
</table>
YEAR 2 BASIC AND PLUS FOOD STRATEGIES
Description of the Intervention

**Section I:**

<table>
<thead>
<tr>
<th>Strategy code:</th>
<th>1</th>
<th>Setting:</th>
<th>School</th>
<th>Year:</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type and Intensity of the Intervention:</strong></td>
<td>Basic</td>
<td>Plus</td>
<td></td>
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</tbody>
</table>

**Name of the intervention:**
Increase fruit and vegetable consumption

\[ \text{Balancing the products sold in the school canteen and increasing the availability of healthier food choices such as fruit and vegetables} \]

**Intervention objectives:**
Raise the availability of fruits, vegetables and healthier food products, so the offer of these is equitable to that of other food products.

**Key actors involved:**
INSP personnel, MoE: AFSEDF/DGOSE, school principals, vendors, canteen committee

**Target group:**
All 1\textsuperscript{st}-6\textsuperscript{th} grade students, school community, vendors

**Length of the intervention (duration):**
October 2007 – July 2008

**Description of the intervention:**

**Permits/Negotiations:**
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
The INSP developed a list of recommended and non recommended food products, based on their energy, fat and sugar content. This list was sent to the MoE for approval.
Once approved, the MoE distributed it to all the intervention schools participating in the program, along with an order for the schools to follow the guidelines specified on the list.
To complement this, the INSP sent a letter to school principals notifying them about the strategy. Enclosed was with it was the list.
School principal's cooperation was necessary for strategy implementation.

**Intervention guidelines:**
The MoE prepared a letter of commitment for the vendors and the members of the canteen committee to sign. The INSP arranged a meeting with the members of the canteen committee and vendors in each school. Members of the INSP, MoE and sector chiefs were present as well as the school principal, the members of the canteen committee and vendors. The members of the canteen committee and the
Vendors signed the letter of commitment agreeing not to sell non recommended products.

In case a vendor sold non recommendable products, the INSP staff member would take note and bring up the issue with the INSP member responsible of the strategy for him or her to mention the situation to the principal for him/her to talk to the vendor. INSP staff members only talked to vendors when they were consulted for doubts and questions which they could directly solve.

Issues concerning food strategies were brought up during technique council meetings.

**Monitoring:**
Members of the INSP personnel visited schools and did regular inventories on all products and quantity of these sold in the school canteen.

**Data collection instruments used:**

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<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>A)</td>
<td>Reports</td>
</tr>
<tr>
<td>B)</td>
<td>Official documents</td>
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<tr>
<td>C)</td>
<td>Power point presentations</td>
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<tr>
<td>D)</td>
<td>Questionnaires</td>
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<tr>
<td>E)</td>
<td>Monitoring reports</td>
</tr>
<tr>
<td>F)</td>
<td>Meeting minutes</td>
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<tr>
<td>G)</td>
<td>Field work diaries</td>
</tr>
<tr>
<td>H)</td>
<td>Interviews → Elena Espinosa, Eduardo Thebar, Arlette Ramírez, Deborah Salvo</td>
</tr>
<tr>
<td>I)</td>
<td>Notes/Comments/Observations</td>
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</table>

A report states that the schools that had not yet had the meeting with MoE authorities have not implemented strategy, in spite of receiving the notification letter from the INSP.

The reason for INSP members responsible for the strategy to bring up issues the principal instead of directly with the vendors was due to problems in the first year of the program. The MoE was responsible for implementing the strategy while the INSP personnel served as guides for this implementation.
Description of the Intervention

Section I:

<table>
<thead>
<tr>
<th>Strategy code:</th>
<th>Setting:</th>
<th>Year:</th>
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<tbody>
<tr>
<td>2</td>
<td>School</td>
<td>2</td>
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</tbody>
</table>

Type and Intensity of the Intervention: Basic Plus

Name of the intervention:
- Increase fruit and vegetable consumption
- Increase fruit and vegetable availability at school

Intervention objectives:
Increase fruit and vegetable availability so the offer of these is equitable to that of other products

Key actors involved:
School principal, canteen committee, vendors, MoE

Target group:
All 1st-6th grade students, school community, vendors

Length of the intervention (duration):
October 2007 – June 2008

Description of the intervention:

Permits/Negotiations:
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
The INSP developed a list of recommendable and non recommendable food products, based on their energy, fat, sugar and sodium content. This list was sent to the MoE for approval.
Once approved, the MoE sent this list to all the intervention schools participating in the program, along with an order for the schools to follow the guidelines specified on the list.
The INSP sent a letter to school principals notifying them about the strategy. Enclosed was also the list.
School principal's cooperation was necessary for strategy implementation.

Intervention guidelines:
The MoE prepared a letter of commitment for the vendors and the members of the canteen committee to sign. The INSP arranged a meeting with the members of the canteen committee and vendors in each school. Members of the INSP, MoE and sector chiefs were present as well as the school principal, the members of the canteen committee and vendors. The members of the canteen committee and the vendors signed the letter of commitment agreeing not to sell non recommendable products.
In case a vendor sold non recommendable products, the INSP staff member should bring up the issue with the members of the canteen committee or the principal for them to talk to the vendor. INSP staff members only talked to vendors when they were consulted for doubts and questions which they could directly solve. Issues concerning food strategies were brought up during technique council meetings. The recommendable products were fruits, vegetables and other healthy food products suggested to be sold in the school canteen. This list was meant to be used by the vendors for them to be aware of which products they should be selling. The options include: raisins, fruit with yoghurt, fruit juices, jicama, cucumbers, carrots, watermelon, mango, melon.

**Monitoring:**
INSP staff members performed routine monitoring by doing inventories of the products and their quantity sold in the school canteen.

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Other (specify)

I) Interviews → Elena Espinosa, Eduardo Thebar, Arlette Ramírez, Deborah Salvo

**Notes/Comments/Observations**

Many vendors were not content with the list and its restriction. They would occasionally ask INSP staff members for suggestions on how to make fruits and vegetables more appealing to the students. INSP staff members would provide them with advice on the matter.
Description of the Intervention

**Section I: Instruction for the data collection personnel**

<table>
<thead>
<tr>
<th>Intervention code: 3</th>
<th>Setting: School</th>
<th>Year: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type and Intensity of the Intervention:</strong></td>
<td><strong>Basic</strong> Plus</td>
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</tbody>
</table>

**Name of the intervention:**
Reduce the offer of products with high sugar and fat content
Reduce the availability of densely energetic products

**Intervention objectives:**
Ban food products with high fat and/or high sugar content from the school canteen

**Key actors involved**
MoE, AFSEDF, DEGOSE, school canteen committee, vendors, school principal, INSP personnel

**Target group:**
All 1st-6th grade students, school community, vendors

**Length of the intervention (duration):**
January 2007 - June 2007

**Description of the intervention:**

**Permits/Negotiations:**
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DEGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DEGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
The INSP developed a list of recommendable and non recommendable food products, based on their energy, fat and sugar content. This list was sent to the MoE for approval.
Once approved, the MoE sent this list to all the intervention schools participating in the program, along with an order for the schools to follow the guidelines specified on the list.
The INSP sent a letter to school principals notifying them about the strategy. Enclosed was also the list.
School principal's cooperation was necessary for strategy implementation.

**Intervention guidelines:**
The MoE prepared a letter of commitment for the vendors and the members of the canteen committee to sign. The INSP arranged a meeting with the members of the canteen committee and vendors in each school. Members of the INSP, MoE and sector chiefs were present as well as the school principal, the members of the canteen committee and vendors. The members of the canteen committee and the vendors signed the letter of commitment agreeing not to sell non recommendable products.
In case a vendor sold non recommendable products, the INSP staff member should bring up the issue with the members of the canteen committee or the principal for
them to talk to the vendor. INSP staff members only talked to vendors when they were consulted for doubts and questions which they could directly solve. Issues concerning food strategies were brought up during technique council meetings. The list was useful for vendors to know which products they had to avoid selling, and in case they did sell these, it provided them suggestions on healthier products.

**Monitoring:**
INSP staff members performed routine monitoring by doing inventories of the products and their quantity sold in the school canteen.

**Data collection instruments used:**
- **A) Reports**
- **B) Official documents**
- **C) Power point Presentations**
- **D) Questionnaires**
- **E) Monitoring reports**
- **F) Meeting Minutes**
- **G) Field work diaries**
- **H) Other (specify) → INSP food list containing products that should be banned from the school canteen, booklet for vendors.**
- **I) Interviews → Helena Espinosa, Eduardo Thebar, Arlette Ramírez, Deborah Salvo**

**Notes/Comments/Observations**
The list was useful for vendors to know which products they had to avoid selling, and in case they did sell these, it provided them suggestions on healthier products. Most schools cooperated with reducing the availability densely energetic products from that canteen. Even though the goal was to eliminate these products, this was not entirely possible due to economical reasons and students preferences for these products. Vendors were not content with the list’s restrictions and argued that the students preferred the products that were restricted.
Description of the Intervention

<table>
<thead>
<tr>
<th><strong>Section I</strong></th>
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<tbody>
<tr>
<td><strong>Intervention code:</strong> 4</td>
</tr>
<tr>
<td><strong>Type and Intensity of the Intervention:</strong> Basic Plus</td>
</tr>
<tr>
<td><strong>Name of the intervention:</strong></td>
</tr>
<tr>
<td>Reduce the offer of products with high sugar and fat content</td>
</tr>
<tr>
<td>Reduce the availability of candy and sweets from the school canteen</td>
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</tbody>
</table>

**Intervention objectives:**
Eliminate food products that represent a short-long term risk to health due to their high sugar and fat content.

**Key actors involved:**
MoE, AFSEDF, DEGOSE, school canteen committee, vendors, school principal

**Target group:**
All 1st-6th grade students, school community, vendors

**Length of the intervention (duration):**
October 2007 – June 2008

**Description of the intervention:**

**Permits/Negotiations:**
The INSP presented the results for the first year of program implementetion to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
The INSP developed a list of recommendable and non recommendable food products, based on their energy, fat and sugar content. This list was sent to the MoE for approval.
Once approved, the MoE sent this list to all the intervention schools participating in the program, along with an order for the schools to follow the guidelines specified on the list.
The INSP sent a letter to school principals notifying them about the strategy. Enclosed was also the list.
School principal's cooperation was necessary for strategy implementation.

**Intervention guidelines:**
The MoE prepared a letter of commitment for the vendors and the members of the canteen committee to sign. The INSP arranged a meeting with the members of the canteen committee and vendors in each school. Members of the INSP, MoE and sector chiefs were present as well as the school principal, the members of the canteen committee and vendors. The members of the canteen committee and the vendors signed the letter of commitment agreeing not to sell non recommendable products.
In case a vendor sold non recommendable products, specifically for this strategy candy and sweets, the INSP staff member should bring up the issue with the members of the canteen committee or the principal for them to talk to the vendor. INSP staff members only talked to vendors when they were consulted for doubts and questions which they could directly solve. Issues concerning food strategies were brought up during technique council meetings.

After analyzing sweets and candy inventories made in the school canteens, quantity and type of candy allowed to be sold were determined. This selection was made based on product’s energy content. These were mainly typical Mexican candy, such as *obleas* and *amaranto*.

The candy and sweets sales were directly dependent from the school canteen and the students were the ones to sell candy during recess.

**Monitoring:**

INSP staff members did routine inventories of all the products sold in the school canteen.

**Data collection instruments used:**

A) Reports

B) **Official documents**

C) Power point Presentations

D) Questionnaires

E) Monitoring reports

F) Meeting Minutes

G) Field work diaries

H) Other (specify)

I) Interviews → Elena Espinosa, Eduardo Thebar, Arlette Ramírez, Deborah Salvo

**Notes/Comments/Observations**

Some schools had already eliminated the sale of candy and sweets.

This strategy intended to reduce sweets and candy availability to the minimum.
Description of the Intervention

Section I:

<table>
<thead>
<tr>
<th>Strategy code:</th>
<th>Setting: School</th>
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<td>5</td>
<td>School</td>
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</tbody>
</table>

Year: 2

Type and Intensity of the Intervention: Basic Plus

Name of the intervention: Water and beverages

Eliminating/limiting the availability of sugared beverages

Intervention objectives:
To reduce students’ energy intake in school by eliminating/limiting the availability of sugared beverages

Key actors involved:
MoE, AFSEDF, DEGOSE, school principal, canteen committee, vendors

Target group:
All 1st-6th grade students, school community, canteen committee

Length of the intervention (duration):
October 2007 – June 2007

Description of the intervention:

Permits/Negotiations:
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
Negotiations with the school principal and members of the canteen committee were made in order to reduce the availability of sugared beverages.
Principals’ cooperation and authorization were necessary for strategy implementation.

Strategy implementation guidelines:
INSP staff members, talked to school authorities on the importance of reducing these products.
The canteen committee was asked to reduce or eliminate their weekly order of Boing cases and substitute it for cases of water.
This slow reduction of the availability of sugared beverages was intended for students to get used to the change and to avoid losses in the school canteen’s finances.
The Boing and water sales were directly dependent from the school canteen and the students were the ones to sell it during recess.

Monitoring:
Routine inventories of Boing and water orders were done by the INSP staff members.
There were renegotiations on how much Boing and water were ordered.
Data collection instruments used:
A) Reports
B) Official documents
C) Power point presentations
D) Questionnaires
E) Monitoring reports
F) Meeting minutes
G) Field work diaries
H) Other (specify)
I) Interviews → Elena Espinosa, Eduardo Thebar, Deborah Salvo

Notes/Comments/Observations
Some schools managed to order the same quantity of water than that of sugared beverages. Schools complained that their sales had reduces due to students preference for Boing over water. Schools cooperated in reducing their order of Bonig and ordering water bottles.
Description of the Intervention

Section I: Instruction for the data collection personnel

<table>
<thead>
<tr>
<th>Intervention code: 6</th>
<th>Setting: School</th>
<th>Year: 2</th>
</tr>
</thead>
</table>
Type and Intensity of the Intervention: Basic Plus
Name of the intervention:
Water and beverages
  Ensure water availability in the schools

Intervention objectives:
Promote water consumption to reduce sugared beverage intake

Key actors involved:
Bonafont water company, INSP, school principals, teachers, MoE

Target group:
All 5th and 6th grade students (water containers in classrooms), and all 1st-6th grade students and school community (water containers in common areas)

Length of the intervention (duration):
October 15th, 2009 - July 31st, 2008

Description of the intervention:

Permits/Negotiations:
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
Negotiations were held between the INSP and “Bonafont” Water Company which resulted in a donation for water. The terms for this were specified in a contract between “Bonafont” and the INSP.
INSP and MoE are to agree on the terms on how to make sure this strategy is being complied.
INSP sent a letter to school principals notifying them about strategy implementation.

Intervention guidelines:
Negotiations between the INSP and “Bonafont” were carried out in order to agree upon the terms concerning the water donation. Both parties signed a contract where Bonafont agreed to distribute 20 liter water containers every 15 days to the intervention schools participating in the program. The INSP in turn was in charge of making sure the containers are used exclusively for the program. They were also in charge of supervising and coordinating delivery. The INSP had to give each school a calendar containing water delivery dates. The INSP was also responsible of giving every school enough siphons for each of the containers.
In order to implement this strategy permission from the MoE had to be granted so the water donation could be accepted.
The MoE requested all the intervention schools participating in the program to report their water needs. Said needs were reported to the MoE by the INSP and not by the schools. Once the water was delivered in the schools, water containers were placed in all 5th and 6th grade classrooms and designated common areas for students to have access to it. In case of delays with the water, the INSP would file a report to the water company for them to be aware of which schools were missing water containers. In case a siphon was damaged or missing, it was the INSP’s responsibility to replace it.

School canteen should also promote water consumption by decreasing sugared beverage availability. Sugared beverages should be banned, or at least their availability should be reduced.

**Monitoring:**
In the report for year 2, a schedule there is a schedule for the water delivery dates. INSP personnel monitored that water was delivered on time. They also monitored that the water containers were in their designated location and their functionality.

**INSP personnel in charge of coordinating strategy:**

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point Presentations

D) Questionnaires

E) Monitoring reports

F) Meeting Minutes

G) Field work diaries

H) Other (specify) → Calendar

I) Interviews → Elena Espinosa, Eduardo Thebar, Arlette Ramírez, Deborah Salvo

**Notes/Comments/Observations**

The INSP installed water filters in 1 school (Jose Lopez Portillo y Weber) therefore water *garrafones* were not delivered there. Most schools had a problem with the students of the afternoon shift, because they would drink the water destined for those of the morning shift.
Section I:

**Intervention code:** 7  
**Setting:** School  
**Year:** 2  
**Type and Intensity of the Intervention:** Basic Plus  

**Name of the intervention:**  
Reduce exposure to eating opportunities  
- Forbid eating during lesson time and promote a 20 minute time limit for school breakfast  

**Intervention objectives:**  
Reduce children’s exposure to eating opportunities during school hours.  
Reinforce a 20 minute time limit for “school breakfast” consumption inside the classroom  

**Key actors involved:**  
MoE, school principal, classroom teachers, INSP personnel, PTA breakfast committee  

**Target group:**  
All 5th and 6th grade students  

**Length of the intervention (duration):**  
October 2007 – June 2008  

**Description of the intervention:**  

**Permits/Negotiations:**  
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.  
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.  
The INSP sent a letter notifying school principal on strategy implementation. Principals’ cooperation and authorization were necessary for strategy implementation.  

**Intervention guidelines:**  
INSP and MoE authorities concur on the importance of promoting fewer opportunities for students to eat during school hours. The MoE sent all the intervention schools a letter requesting school teachers and authorities to support the no eating during lesson time strategy.  
In the classrooms, the teachers had to make sure their students only ate “school breakfast” during the designated 20 minutes. Teachers had to ensure that the students either finish their “school breakfast” or put it away and save it for recess. They also had to make sure students didn’t eat during lesson time.  
INSP personnel developed a “clock” to use for this strategy to reinforce the 20 minute time limit to eat “school breakfast”. This clock is called the “Nutridinamico clock” and it was given to every teacher by a member of the INSP to reinforce the
strategy. When teachers were given this clock, they were also given a reminder about the importance of not allowing their students to eat during lesson time. When breakfast time started, someone has to turn the clock to the side where it says they have 20 minute to eat. Once time is up, the clock must be turned to the other side and no one was allowed to eat or drink in class. Only water is permitted. The teacher is responsible of making sure students stop eating, and that they don’t eat during lesson time. In case a student had leftover food or beverages, he/she had to put it away.

The principals supported INSP strategy by reminding the teachers, and therefore reinforcing the school regulation to forbid eating during lesson to all classroom teachers.

**Monitoring:**
During the basal and final evaluation periods, INSP staff members conducted observations inside the classrooms to verify that “school breakfast” only lasted 20 minutes and that the students put away any leftovers they had.

**Data collection instruments used:**

- **A) Reports**
- **B) Official documents**
- **C) Power point Presentations**
- **D) Questionnaires**
- **E) Monitoring reports**
- **F) Meeting Minutes**
- **G) Field work diaries**
- **H) Other (specify)**
- **I) Interviews → Elena Espinosa, Eduardo Thebar, Arlette Ramírez, Deborah Salvo**

**Notes/Comments/Observations**
Description of the Intervention

Section I:

**Intervention code:** 8

**Setting:** School

**Year:** 2

**Type and Intensity of the Intervention:** Basic Plus

**Name of the intervention:**
Reduce exposure to eating opportunities

Promote recess as the only period during school hours to allow eating

**Intervention objectives:**
Reduce students’ exposure to eating opportunities during school hours
Reinforce the school norm of allowing students to eat only during lesson time.

**Key actors involved**
School principal, classroom teachers, MoE

**Target group:**
All 1st-6th grade students

**Length of the intervention (duration):**
October 2007 – June 2008

**Description of the intervention:**

<table>
<thead>
<tr>
<th>Permits/Negotiations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program. The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring. Principal’s authorization and cooperation was necessary for strategy implementation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intervention guidelines:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The INSP offered the MoE their guidelines on how to implement this. The 30 minutes of recess were divided into two 15 minute fractions. Food sales should only last 15 minutes and the remaining 15 minutes should be destined to PA.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitoring:</th>
</tr>
</thead>
<tbody>
<tr>
<td>The INSP made a recommendation stating that only 15 minutes of recess period were to be destined to food sales. The MoE, backed up this strategy with a request for schools to abide by this. Food sales should only be encouraged during the designated period of time (15 minutes).</td>
</tr>
</tbody>
</table>

INSP staff members did a routine monitoring on the duration of the recess period and of the duration of the food sales during recess.
Data collection instruments used:

A) Reports

B) Official documents

C) Power point Presentations

D) Questionnaires

E) Monitoring reports

F) Meeting Minutes

G) Field work diaries

H) Other (specify)

I) Interviews → Elena Espinosa, Eduardo Thébar, Arlette Ramírez, Deborah Salvo

Notes/Comments/Observations
YEAR 2 PLUS AND BASIC PA STRATEGIES
# Description of the Intervention

**Section I:**

<table>
<thead>
<tr>
<th>Strategy code:</th>
<th>9</th>
<th>Setting:</th>
<th>School</th>
<th>Year:</th>
<th>2</th>
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<tbody>
<tr>
<td><strong>Type and Intensity of the Intervention:</strong></td>
<td>Basic Plus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Name of the intervention:</strong></td>
<td>Increase PA during recess and school hours</td>
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<tr>
<td><strong>Intervention objectives:</strong></td>
<td>For students to have more opportunities to be active during the recess by participating in organized activities. To increase students’ PA during recess so they achieve the International Recommendations.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Key actors involved:</strong></td>
<td>PE instructors, teachers, DGEF, school principal</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Target group:</strong></td>
<td>All 1st-3rd and all 4th-6th grade students</td>
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<td></td>
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</tr>
<tr>
<td><strong>Length of the intervention (duration):</strong></td>
<td>October 2007 – June 2008</td>
<td></td>
<td></td>
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</tbody>
</table>

**Description of the intervention:**

The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program. The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.

DGEF authorities requested for all schools to have an active recess period. PE instructors were designated to be responsible of implementing the active recess strategy. A schedule was designed for PE instructors to be able to implement all PA program strategies. Principal’s cooperation and authorization were necessary for strategy implementation.

**Strategy guidelines:**

INSP sent a letter to all school principals notifying them about strategy implementation, which was complemented by a commitment letter sent by the DGEF for principals and PE instructors to sign. DGEF was in charge of implementing the strategy in the school. They would send supervisors to the schools and in case it was necessary, they would also send someone to conduct the active recess. The INSP gave all plus schools equipment to conduct active recess, such as jump ropes and balls.
Active recess was scheduled for a fifteen minutes duration, during which food sales were not permitted. During this period of time, an activity or game had to be organized and supervised by the PE instructor or by the person sent by the DGEF. It had to be an activity that allowed children to perform moderate to vigorous PA. Also, in case the PE instructor could not conduct active recess, the equipment was available for the students to use it.

**Monitoring:**
INSP staff members conducted routine monitoring of the recess period. Every time recess was monitored, SOFIT (System for Observing Fitness Instruction Time) evaluations were made to observe students’ activity during recess.

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Other (specify)

I) Interviews ➔ Catalina Medina, Elena Espinosa, Santiago Henao, Deborah Salvo

**Notes/Comments/Observations**

Not all schools implemented the active recess strategy every day. Sometimes children were given PA equipment but there was no supervision or guided activity. Some schools designated 1 day of the week for every grade and that was the day for those students to participate in active recess. In many schools, food sales lasted the entire recess period affecting students’ participation in activities. Active recess was mainly intended for 5th and 6th graders; however, students from all the grades participated.
Description of the Intervention

Section I:

Strategy code: 10  
Setting: School  
Year: 2  
Type and Intensity of the Intervention: Basic  
Plus  
Name of the intervention: Increase PA during recess and school hours  
Activation routine  

Intervention objectives:  
For children to have a 20 minute organized workout before starting their lessons in order for them to achieve the International Recommendation for daily active minutes.  

Key actors involved:  
School principal, teaches, PE instructors, INSP personnel, DGEF  

Target group:  
All 1st-6th grade students, school community, PE instructors  

Length of the intervention (duration):  
October 2007 – June 2008  

Description of the intervention:  

Permits/Negotiations:  
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.  
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.  
The INSP negotiated with DGEF authorities in meeting and through letters in order to implement the activation routines. This led to a direct order from the DGEF to implement this strategy in all plus intervention schools.  
To compliment this order, the INSP sent a letter to school principals notifying them about strategy implementation.  
The person in charge of conducting the activation routine was the PE instructor. DGEF called for PE sector chiefs to request all plus PE instructors to attend a training session for the activation routine strategy. This session took place at the INSP.  
DGEF sent a report informing how strategy was being implemented.  
A schedule was designed for PE instructors to be able to implement all PA program strategies.  
DGEF was in charge of appointing additional PE instructors in case these are required.  
The time that PE instructors dedicate to activation routines would be counted as work hours by the DGEF.  
Principal’s cooperation and authorization were necessary for strategy implementation.
Strategy implementation guidelines:
DGEF was in charge of strategy implementation. PE instructors received a training workshop on how to properly conduct an activation routine. There, they were given a mix CD with music for the routines. The school’s PE instructor or a PE instructor assigned by the DGEF conducted this daily routine. Said routine that consisted on:
   - Warm-up/stretching
   - Exercise routine
   - Cool down
All students had to participate in the 20 minute exercise routine. This routine was scheduled from 8:00 am until 8:20 am from Tuesday through Friday.

Monitoring:
INSP personnel conducted routine monitoring to confirm that that activation was taking place and that it was conducted in a proper manner by verifying its duration, students’ participation, teachers’ presence and participation. Observations using SOFIT (System for Observing Fitness Instruction Time) were conducted to evaluate physical activity.

Data collection instruments used:
   A) Reports
   B) Official documents
   C) Power point presentations
   D) Questionnaires
   E) Monitoring reports
   F) Meeting minutes
   G) Field work diaries
   H) Other (specify)
   I) Interviews ➔ Catalina Medina, Elena Espinosa, Santiago Henao, Deborah Salvo

Notes/Comments/Observations
The activation routine has been cancelled in some occasions due to cold weather or environmental contingency. Another common reason for cancelation is PE instructor’s unpunctuality. In some schools if the PE instructor or the person responsible of conducting the activation routine was late or did not show up, someone else would conduct the activation routine.
# Description of the Intervention

## Section I:

<table>
<thead>
<tr>
<th><strong>Strategy code:</strong></th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Setting:</strong></td>
<td>School</td>
</tr>
<tr>
<td><strong>Year:</strong></td>
<td>2</td>
</tr>
</tbody>
</table>

### Type and Intensity of the Intervention:
- **Basic** + **Plus**

### Name of the Intervention:
- PE lessons
- 50 effective minutes: one weekly lesson

### Intervention objectives:
To ensure students receive 50 effective minutes of PA through PE lessons weekly to fulfill the International active minute recommendation.

### Key actors involved:
- School principal
- PE instructors
- AFSEDF/DGEF

### Target group:
- 5th and 6th grade students

### Length of the intervention (duration):
- October 2007 – June 2008

### Description of the intervention:

#### Permits/Negotiations:
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.

The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and monitoring.

DGEF sent a notification to PE sector chiefs informing them that basic schools PE instructors were to conduct one weekly PE lesson with a 50 minute duration.

A schedule was designed for PE instructors to be able to implement all PA program strategies.

INSP sent school principals a letter informing them about strategy implementation. Principal's cooperation and authorization were necessary for strategy implementation.

#### Strategy implementation guidelines:
The INSP played the role of promoting this strategy, while the DGEF was in charge of its implementation.

PE lessons were to have a 50 minute duration. Also, PE instructors were to follow guidelines and recommendations to conduct the lesson in order to achieve a maximum of effective minutes.

School principals were to cooperate in not cancelling PE lessons.

#### Monitoring:
INSP personnel did routine monitoring to verify the 50 minutes of weekly PE lessons were being covered. They also conducted observations on PE lesson content using SOFIT (System for Observing Fitness Instruction Time).

### Data collection instruments used:
A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Other (specify)

I) Interviews → Catalina Medina, Elena Espinosa, Santiago Henao, Deborah Salvo

Notes/Comments/Observations

PE lessons were sometimes cancelled due to environmental contingency or rehearsals for festivals.
Description of the Intervention

Section I:

**Strategy code:** 12  
**Setting:** School  
**Year:** 2  

**Type and Intensity of the Intervention:** Basic Plus

**Name of the intervention:** PE lessons

100 effective minute: 2 weekly PE lessons

**Intervention objectives:**
Achieving 100 weekly minutes dedicated to PE lessons and for at least 25 minutes to be dedicated to MVPA.

**Key actors involved:**
School principal, PE instructors, AFSEDF/DGEF

**Target group:**
5th and 6th grade students

**Length of the intervention (duration):**
October 2007 – June 2008

**Description of the intervention:**

**Permits/Negotiations:**
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
INSP sent school principals a letter informing them about strategy implementation.
DGEF authorities agreed on strategy implementation and proposed to support strategy implementation with 3 PE instructors from the DGEF while permanent human resources were hired in the schools.
A schedule was designed for PE instructors to be able to implement all PA program strategies.
Principal's cooperation and authorization were necessary for strategy implementation

**Strategy implementation guidelines:**
The INSP played the role of promoting this strategy, while the DGEF was in charge of its implementation.
PE lessons had to have a 50 minute duration. Also, PE instructors had to follow guidelines and recommendations to conduct the lesson in order to achieve a maximum of effective minutes.
All 5th and 6th grade classrooms must two PE lessons a week.
School principals were to cooperate in not cancelling PE lessons.

**Monitoring:**
INSP personnel did routine monitoring to verify the 100 minutes of weekly PE lessons were being covered. They also conducted observations on PE lesson content using SOFIT (System for Observing Fitness Instruction Time).

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Other (specify)

I) Interviews → Catalina Medina, Elena Espinosa, Santiago Henao, Deborah Salvo

**Notes/Comments/Observations**

PE lessons were sometimes cancelled due to environmental contingency or rehearsals for festivals.
Description of the Intervention

Section I: Instruction for the data collection personnel

<table>
<thead>
<tr>
<th>Intervention code: 13</th>
<th>Setting: School</th>
<th>Year: 2</th>
</tr>
</thead>
</table>

**Type and Intensity of the Intervention:** Basic Plus

**Name of the intervention:** Improving school premises to promote PA
  - Painting the patio floor

**Intervention objectives:**
To provide children the means to perform recreational activities during recess period as well as during school hours

**Key actors involved:**
School principal, teachers, PE instructors, PTA, DGEF, INSP personnel, sector chiefs

**Target group:**
School facilities

**Length of the intervention (duration):**
The painting job was done in 1-3 days at the beginning of the intervention.
The games that were painted on the patio lasted there throughout the entire intervention that is until June 2008.

**Description of the intervention:**

**Required permits and negotiations:**
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
DGEF requested PE sector chiefs’ support for the floor painting strategy implementation. INSP requested parents’ participation during strategy implementation
Authorization from the school principal was obligatory for strategy implementation
If the painting job is done during the weekend, school janitor cooperation had to be required.

**Strategy guidelines:**
The INSP sent a letter notifying the school principal about strategy implementation.
The INSP gave the schools all necessary material for strategy implementation.
School principals had to notify INSP and DGEF when date to paint is scheduled in order for a member of the INSP to be present during patio painting.
PE instructors established which games were to be painted on the patio. The quantity of the games depends on the size of the patio. Spacing between each painted game must be established. Game selection is: stop, avion, cuadros, and drawing up the boundaries of basketball/volleyball/soccer courts.
All painting material was given to the PTA for them to do the job. INSP personnel also participated during the painting process.

**Monitoring:**
A written confirmation of the process by a school authority in an official document was requested as a follow-up of the intervention.
Pictures were taken during the painting process as evidence.

**Data collection instruments used:**
- A) Reports
- B) Official documents
- C) Power point presentations
- D) Questionnaires
- E) Monitoring reports
- F) Meeting minutes
- G) Field work diaries
- H) **Other (specify):** pictures
- I) **Interviews** Deborah Salvo
YEAR 2 BASIC AND PLUS COMMUNICATION/EDUCATION COMPONENT
## Description of the Intervention

**Section I:**

<table>
<thead>
<tr>
<th>Strategy code: 14</th>
<th>Setting: School</th>
<th>Year: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type and Intensity of the Intervention:</strong></td>
<td><strong>Basic</strong></td>
<td><strong>Plus</strong></td>
</tr>
<tr>
<td><strong>Name of the intervention:</strong></td>
<td>Massive communication strategies</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Posters of the Nutridinamicos</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Intervention objectives:</strong></td>
<td>To reinforce the food and PA strategies which are being implemented at school</td>
<td></td>
</tr>
<tr>
<td></td>
<td>For students to be interested in behaviors related to the overweight/obesity problem and for them to analyze how these behaviors directly affect their lives.</td>
<td></td>
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<tr>
<td></td>
<td>To increase students’ motivation to develop self care competences.</td>
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<tr>
<td></td>
<td>To motivate students towards achieving the health benefits they perceive (&quot;eating healthy&quot; and &quot;being strong&quot;) by generating creative ways to achieve desired diet and PA behaviors.</td>
<td></td>
</tr>
<tr>
<td><strong>Key actors involved:</strong></td>
<td>INSP personnel, school principal</td>
<td></td>
</tr>
<tr>
<td><strong>Target group:</strong></td>
<td>All 5th – 6th grade students (posters in the classrooms) and all 1st-6th grade students (posters in common areas)</td>
<td></td>
</tr>
<tr>
<td><strong>Length of the intervention (duration):</strong></td>
<td>January 2008 – June 2008</td>
<td></td>
</tr>
<tr>
<td><strong>Description of the intervention:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Permits/Negotiations:</strong></td>
<td>The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.</td>
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<td></td>
<td>The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.</td>
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<tr>
<td></td>
<td>INSP program coordinator sent a letter notifying school principal on strategy implementation.</td>
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<tr>
<td></td>
<td>Principal’s cooperation and authorization were necessary for strategy implementation</td>
<td></td>
</tr>
<tr>
<td><strong>Strategy implementation guidelines:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The campaign posters were placed on the bulletin board newspaper, a different poster for each bulletin board starting from January.

The only exception was the first poster, showing all the “Nutridinamicos”, which followed the same logistic as in the first year of the intervention: one poster inside each 5th and 6th grade classroom and poster in a common area, which in this case was the bulletin board newspaper.

The posters used were “Aquasplash”, “Avtiva” and “Frutachon and Sanamaravilla”. These were not posted in the classrooms.

The “Luna Lunch” poster was not used due to the fact that is was considered the most complex behavior to promote among the students and because the behaviors promoted by the “Aquasplash”, “Frutachon” and “Sanamaravilla” posters were included in a healthy lunch.

The “Deportennis” poster was not used during the second year of the program due to insufficient budget to print it out.

**Monitoring:**
Routine monitoring was done to verify the posters and the bulletin board newspaper were in good conditions. Also, when posters were switched, the person had to verify the conditions of the previous poster, if it’s been vandalized or relocated.

**Data collection instruments used:**
- A) Reports
- B) Official documents
- C) Power point presentations
- D) Questionnaires
- E) Monitoring reports
- F) Meeting minutes
- G) Field work diaries
- H) Other (specify) → posters of the *nutridinamicos*
- I) Interviews → Catalina Medina, Elena Espinosa, Arlette Ramírez

**Notes/Comments/Observations**
Section I:

<table>
<thead>
<tr>
<th>Strategy code:</th>
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<th>School</th>
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<th>2</th>
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<tbody>
<tr>
<td>Type and Intensity of the Intervention:</td>
<td>Basic</td>
<td>Plus</td>
<td></td>
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<tr>
<td>Name of the intervention:</td>
<td>Massive communication strategies</td>
<td>Bulletin board newspaper</td>
<td></td>
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</tr>
<tr>
<td>Intervention objectives:</td>
<td>For students to be interested in behaviors related to the overweight/obesity problem and for them to analyze how these behaviors directly affect their lives.</td>
<td>To increase students’ motivation to develop target self care competences.</td>
<td>For teachers, PE instructors and principals to be interested in learning about self care competences transmitted to them through the bulletin board newspaper and the newsletters</td>
<td>For teachers, PE instructors and school principals to be involved with the INSP staff.</td>
<td></td>
</tr>
<tr>
<td>Key actors involved:</td>
<td>INSP personnel, school authorities</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Target group:</td>
<td>All 1st-6th grade students, school community</td>
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</tr>
<tr>
<td>Description of the intervention:</td>
<td>The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.</td>
<td>The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.</td>
<td>The INSP program coordinator sent a letter to the school principals notifying them about strategy implementation. Principal's cooperation and authorization were necessary for strategy implementation. The principal had to agree on the location of the bulletin board newspaper.</td>
<td>The design for each bulletin board was done with one month of anticipation. A pilot test was done and any improvements or corrections were made before placing the boards in the schools. Also, a week before placing them in the schools, a sample board was placed in the INSP staff room for all the implementers to see it and make sure it was the same in all the schools.</td>
<td>A two week period was scheduled to place the bulletin boards in all the schools. INSP staff managed to place for one to three boards per day, depending on their activities. Two staff members were in charge of strategy implementation and went to the schools where the board was being placed to help out and make sure they were correctly assembled. Also, beside each bulletin board a mailbox, “Nutridinamico mailbox”, was placed. This was used</td>
</tr>
</tbody>
</table>
to collect letters from the students or their responds to the activities/trivia the INSP organized.

Any board component that was damaged or missing had to be replaced during a two day period. This was in order to maintain boards identical in all schools.

Once the bulletin board was placed, INSP staff had to notify the students and invite them to see it.

The posters placed along with the bulletin boards were “Aquasplash”, “Activa” and “Frutachon and Sanamaravilla”

Boards were scheduled to change every three months.

The first bulletin board was placed in the schools in October. It included:
- An explanation of the Project’s phases.
- An explanation of the project’s strategies.
- Each school’s results from the first year of implementation.
- Drawings of the season’s fruits and vegetables that should be eaten on order to prevent colds made by the 5th and 6th grade students.
- The poster with all the “Nutridinamicos”.

The second bulletin board was scheduled for the third week of January, and it had to be replaced in most schools due to damages. It contained:
- The self care competences promoted by the Program.
- Explanations about the activities for that period.
- A reflective warning from the “Nutridinamicos” concerning unhealthy behaviors.
- An invitation to all the students to participate in a contest: "Create a Comic"
- An activity to make up a song, a riddle or a story on how to eat more fruits and vegetables and how to be more active (answers should be placed in the mail box)
- Reinforcing the concepts learned during the Comic Strip Workshop
- The “Aquasplash” poster
- The “Activa” poster

The third bulletin board was placed in the schools on the third week of April. It included:
- Project’s advances and scheduled activities
- Reinforcing the concepts learned during the Nutrichef Workshop: the health benefits obtained by eating fruits and vegetables.
- Reflective information concerning three behaviors promoted by the program: using the “Nutridinamico clock”, drinking water and eating fruits and vegetables during recess.
- An invitation to a contest: “Create a superpowerful recipe”
- A crossword puzzle (for answers to be placed in the mail box)
- “Frutachon” and “Sanamaravilla posters

The bulletin board newspaper was to be hung at approximately 1.3 meters so the students could see it and read its content.

**Monitoring:**
INSP personnel did routine monitoring to make sure the bulletin boards were in good conditions.
Data collection instruments used:
   A) Reports
   B) Official documents
   C) Power point presentations
   D) Questionnaires
   E) Monitoring reports
   F) Meeting minutes
   G) Field work diaries
   H) Other (specify) → posters of the Nutridinamics
   I) Interviews → Elena Espinosa, Catalina Medina, Arlette Ramírez

Notes/Comments/Observations
There was very little respect for the bulletin board newspaper in the schools. They were occasionally damaged and vandalized. Students did show interest towards this and they usually did read it. While the INSP staff members were placing the bulletin board newspaper they sometimes invited students and teachers to participate and to see it. The mailbox was often destroyed or went missing. It only worked at the beginning of the strategy.
## Description of the Intervention

**Section I:**

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<td>Plus</td>
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<tr>
<td><strong>Name of the intervention:</strong></td>
<td>Interpersonal communication strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Workshop for the students:</strong></td>
<td>create a comic strip</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Intervention objectives:

- For 5th and 6th grade students to be interested in behaviors related to the overweight/obesity problem and for them to analyze how these behaviors directly affect their lives.
- For 5th and 6th grade students to attempt to find a creative solution, in reference to the overweight/obesity related behaviors.
- To increase 5th and 6th graders’ motivation to develop self care competences
- To motivate 5th and 6th grade students towards achieving the health benefits they perceive (“eating healthy” and “being strong”) by generating creative ways to achieve desired diet and PA behaviors.
- For 5th and 6th grade students to suggest diet and PA related behaviors leading towards the perceived health benefits (“eating healthy” and “being strong”).
- For 5th and 6th grade students to choose/prefer healthier food choices over those with elevated energy content.
- For 5th and 6th grade students to try to moderate food and beverage consumption inside the classroom by using a reinforcing component: the “Nutridinamico Clock”.

### Key actors involved:

- INSP personnel
- School principal
- 5th and 6th grade teachers

### Target group:

- 5th and 6th grade students

### Length of the intervention (duration):

One workshop was given in every school in every 5th and 6th grade group.

### Description of the intervention:

### Permits/Negotiations:

The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOS. Also, INSP sensitized all authorities on the importance of continuing with the program.

The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOS and DGESF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.

INSP program coordinator sent a letter to the school principals notifying them about strategy implementation.

Principal’s cooperation and authorization were necessary for strategy implementation

5th and 6th grade teachers’ authorization to conduct the workshop during lesson time.

### Strategy implementation guidelines:

- All workshop implementers received training in order to standardize them so the workshop was conducted in the same manner in all schools.
- There were two implementers per workshop.
- The workshops were scheduled from Tuesday-Friday from 9:00-10:30 for 5th grade groups and from 11:30-12:30 for 6th grade groups. Ideally both workshops should have the same
duration, but due scheduled lessons this was not possible. INSP staff members conducted from 4 to 6 workshops per day. When only 4 workshops were given, the next day two INSP staff members had to return to the school to conduct the missing workshops. In case a workshop could not be conducted, it was rescheduled on a Monday. For circumstantial reasons, such as absence from school, some students did not receive the workshop.

At the end of the workshop, the INSP implementer gave the classroom a “Nutridinamico clock”, which was a cardboard circle with a picture of the “Nutridinamicos” on one side and a sign saying breakfast time had a 20 minute duration on the other side. The INSP staff member explained the instructions to use it: when breakfast time begins, someone had to turn the clock to the side where it says students have 20 minute to eat. Once time was up, the clock had to be turned to the other side and as of that moment, no one was allowed to eat or drink in class. Only water is permitted.

The workshop consisted of three parts:
For the first part, the students pretended to be investigators inside their schools and find which unhealthy behaviors the students were doing. Then, they would give different suggestions on how to change these unhealthy behaviors for healthier ones.

The second part of the workshop focused on reviewing with the students the different parts make up a story: exposition, rising action, climax, falling action and resolution. This is for the students to learn how to later develop their own comic strip. Also, during this part of the workshop, the attributes for the protagonist and the antagonist are mentioned.

During the third part of the workshop, the students had to choose between two different activities:

- Create and antagonist with superpowers, which will reflect their comprehension about unhealthy behaviors.
- Created a comic strip using all the elements of a story, which will reflect their intention of solving a problem through a healthy behavior.

Also, as part of this strategy, a contest was planned out as an activity to reinforce the concepts learned during the workshop. It was held approximately 15-20 days after the workshop. The rules and guidelines for the contests were mentioned at the end of the workshop and on the bulletin board newspaper. To enter the contest, the students would give their comic strips to the teachers or put them in the Nutridinamico mailbox and INSP staff members would come by and collect them.

**Monitoring:**
The teacher was given a form for him/her to fill out to monitor the workshop.

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes
G) Field work diaries

H) Other (specify)

I) Interviews → Catalina Medina, Elena Espinosa, Arlette Ramírez

Notes/Comments/Observations

The workshop worked out well. The students were excited and they enjoyed it. Teachers also showed interest. They participated during the workshop. There was a good turnout for the contest. The overall winners received prices: 1st place received a bicycle, 2nd place received in line skates and 3rd place winner received a soccer ball, a volley ball and a basket ball.
Description of the Intervention

Section I:

Strategy code: 17
Setting: School
Year: 2

Type and Intensity of the Intervention: Basic  Plus

Name of the intervention:
Interpersonal communication strategies
Workshop for the students: Nutrichef

Intervention objectives:
For 5th and 6th grade students to be interested in behaviors related to the overweight/obesity problem and for them to analyze how these behaviors directly affect their lives.
To increase 5th and 6th graders' motivation to develop target self care competences.
To motivate 5th and 6th grade students towards achieving the health benefits they perceive ("eating healthy" and "being strong") by generating creative ways to achieve desired diet and PA behaviors.
For 5th and 6th grade students to suggest diet and PA related behaviors leading towards the perceived health benefits ("eating healthy" and "being strong").
For 5th and 6th grade students to choose/prefer healthier food choices over those with elevated energy content.
For 5th and 6th grade students to try to increase their fruit and vegetable consumption by learning how to prepare healthy recipes.

Key actors involved:
INSP personnel, school principal, 5th and 6th grade teachers

Target group:
5th and 6th grade students

Length of the intervention (duration):
Each workshop had a 1.5 hour duration. Every 5th and 6th grade group in plus and basic schools participated in a workshop.

Description of the intervention:

Permits/Negotiations:
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF were in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
The INSP project coordinator sent the principals a letter notifying them of strategy implementation.
Principal’s authorization was necessary for strategy implementation.
5th and 6th grade teachers’ authorization to conduct the workshop during lesson time

Strategy implementation guidelines:
A pilot workshop was done in a school that did not participate in the Program. The workshop was modified and improved before strategy implementation.
All workshop implementers received training in order to standardize them so the workshop was conducted in the same manner in all schools.
There were two implementers per workshop.
The workshops were scheduled from Tuesday-Friday from 9:00-10:30 for 5th grade groups
and from 11:30-12:30 for 6th grade groups. Ideally both workshops should have the same duration, but due to scheduled lessons this was not possible. ISNP staff members only conducted 4 workshops per day due to insufficient personnel. Therefore this implied that ISNP staff members had to visit each school at least twice. In case a workshop could not be conducted, it was rescheduled on a Monday. For circumstantial reasons, such as absence from school, some students did not receive the workshop.

Also, as part of this strategy, contest was planned out as an activity to reinforce the concepts learned during the workshop. It was held approximately 15-20 days after the workshop. The rules and guidelines for the contests were mentioned at the end of the workshop and on the bulletin board newspaper.

This workshop consisted of two parts:

The first half was focused on promoting students to ponder why it’s important to eat more fruits and vegetables. This was done by reminding them of the health benefits fruits and vegetables using the Nutridinamicos characters “Frutachon” and “Sana-Maravilla” and the colors they have: Yellow, red, green white, orange and purple. Each color was associated with a health benefit. Once the students were aware of all the health benefits, they had to think about which ones they were missing. Then students developed suggestions for their parents and canteen vendors to include as many of the superpowers of fruits and vegetables in their lunch.

The second part of the workshop consisted in giving the students the necessary tool for them to have a change in their behaviors; this was done through encouraging them to create “super powerful” recipes using fruits and vegetables and other healthy ingredients.

**Monitoring:**
The teacher was given a form for him/her to fill out to monitor the workshop.

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Other (specify)

I) Interviews → Catalina Medina, Elena Espinosa, Arlette Ramírez

**Notes/Comments/Observations**

Students enjoyed the workshop
Section I:

Strategy code: 18  Setting: School  Year: 2
Type and Intensity of the Intervention: Basic  Plus

Name of the intervention:
Interpersonal communication strategies
Newsletter for parents

Intervention objectives:
For 5th and 6th graders’ parents to be interested in learning about self care competences transmitted to them through the newsletters
For 5th and 6th graders’ parents to be interested in feeding their children a healthy diet and encouraging them to do PA
For 5th and 6th graders’ parents to put in practice the advice on how to have a healthier diet and how to be more active, provided to them by the newsletters.

Key actors involved:
INSP personnel, teachers, school principals

Target group:
5th and 6th graders’ parents and 5th and 6th grade students

Length of the intervention (duration):
November 2007 – June 2008

Description of the intervention:

Permits/Negotiations:
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.
INSP sent a letter to the school principals informing them of strategy implementation. Principal’s authorization was necessary for strategy implementation

Strategy implementation guidelines:
4 newsletters for parents were made by the INSP and given to all 5th and 6th graders. These newsletters were handed out every two months. Each newsletter contained a section on healthy lifestyles, one on diet and one on PA.
The procedure that was followed for newsletter delivery was the following:
INSP personnel requested 5th and 6th grade lists of students.
The member of the INSP personnel had to personally hand the newsletters to the classroom teachers for them to give to the students.
In case a student missed school on the day newsletters were delivered, the member of the INSP staff had to write the student’s name and last name on a newsletter. These newsletters were given to the teacher for him/her to hand out to the students on the next day.
The first newsletter was scheduled for November. Its content was:

  Definition of healthy lifestyles
  The benefits of promoting healthy lifestyles
  “Test” to evaluate child’s diet
  Social perception of PA in Mexico
Suggestions on how to have a healthier lifestyle, being more active and eating healthier

The second newsletter was scheduled for January and its content was:
- Social perception of healthy lifestyles in Mexico
- Mention the benefits of parents encouraging their children to have a healthy diet
- “Test” Are your children physically active?
- Suggestions on how to have a healthier lifestyle, being more active and eating healthier

The third newsletter was scheduled for March, and its content was:
- “Test”: Evaluate your lifestyle
- Social perception of diet in Mexico
- Mention the benefits of parents encouraging their children to being physically active
- Mention the benefits of parents encouraging their children to have a healthy diet
- Suggestions on how to have a healthier lifestyle, being more active and eating healthier

The fourth newsletter was scheduled for May, and its content was:
- How to overcome obstacles
  - Achieving and maintaining a healthy lifestyle
  - Improving your diet
  - Increasing PA performance
- Monitoring progress on:
  - Achieving and maintaining a healthy lifestyle
  - Improving your diet
  - Increasing PA performance
- Suggestions on how to have a healthier lifestyle, being more active and eating healthier

**Monitoring:**
A member of the INSP staff returned to the school within the following 3 days to verify the remaining newsletters were handed out. He/she asked the teacher which day the newsletter was given to the student.
In case the student did not show up in school during that period of time, an “F” was marked on the list beside the student’s name as a sign that he/she never received the newsletter.
INSP staff member picked up all remaining newsletters.

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Other (specify) ➔ Newsletters
I) **Interviews** ➔ Catalina Medina, Elena Espinosa

**Notes/Comments/Observations**

Usually there were no remaining newsletters.
## Description of the Intervention

### Section I:

<table>
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<th>Strategy code:</th>
<th>19</th>
<th>Setting:</th>
<th>School</th>
<th>Year:</th>
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<tr>
<td>Type and Intensity of the Intervention:</td>
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<tr>
<td>Name of the intervention:</td>
<td>Interpersonal communication strategies</td>
<td>Meeting with the canteen committee and vendors</td>
<td></td>
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</tr>
</tbody>
</table>

### Intervention objectives:

Promote healthy eating habits by modifying canteen food preparation and increasing fruit and vegetable availability.

For school canteen committee, vendors and section chiefs to be informed of the list containing food and beverages which are recommended and those which are not.

### Key actors involved:

INSP personnel, section chiefs

### Target group:

Canteen committee, vendors, school principals

### Length of the intervention (duration):

One day in each school

### Description of the intervention:

#### Permits/Negotiations:

The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.

The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.

INSP program coordinator sent a letter to the school principals notifying them on strategy implementation.

#### Strategy implementation guidelines:

An INSP staff member scheduled a meeting in every school with the principal, the members of the canteen committee, the vendors and the sector chiefs were invited.

On the day of each meeting, INSP staff members took height, weight and blood pressure measurements of all the participants.

After this, there was a short presentation on how to own a healthy business. During this presentation, a legal fundament, handed to the INSP by the MoE, was introduced read. This document stated that all foods and beverages sold inside the school must be in accordance to the list of recommendable and non recommendable products developed by the INSP.

After the legal fundament was presented, a debate took place where vendors and members of the canteen committee could give their input on the subject.

After this, the members of the canteen committee and vendors are to sign a letter of commitment stating that they will follow these guidelines.

At the end of the meeting, the INSP staff presented the group’s results on the measurements taken at the beginning of the workshop. Also, individual results were given to each participant.

#### Monitoring:

An INSP made a written report of the meeting in each school.

### Data collection instruments used:
A) Reports
B) Official documents
C) Power point presentations
D) Questionnaires
E) Monitoring reports
F) Meeting minutes
G) Field work diaries
H) Other (specify)
I) Interviews \(\rightarrow\) Elena Espinosa, Eduardo Thebar

**Notes/Comments/Observations**

| Year 2 report includes the list of scheduled meetings. Meetings are scheduled from November to December 2007. |
Description of the Intervention

Section I:

<table>
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<th>Strategy code: 20</th>
<th>Setting: Centro de Maestros Celerino Cano</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year: 2</td>
<td></td>
</tr>
</tbody>
</table>

**Type and Intensity of the Intervention:** Basic Plus

**Name of the intervention:**
- Interpersonal communication strategies
- Sensitizing workshop for PE instructors

**Intervention objectives:**
- To familiarize PE instructors with the overweight/obesity problematic
- To motivate PE instructors in self-care
- Motivate PE instructors to be role models to promote healthy lifestyles among the students

**Key actors involved:**
- DGEF, PE sector chiefs, INSP staff members

**Target group:**
- PE instructors

**Length of the intervention (duration):**
- Each workshop had 4 hour duration. Workshops were given during three different dates.
- Each PE instructor had to attend one workshop.

**Description of the intervention:**

**Permits/Negotiations:**
- The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.
- The DGEF implemented this workshop for the PE instructors.
- DGEF requested PE sector chiefs to allow PE instructors attend to the workshop.

**Strategy implementation guidelines:**
- A workshop was designed for the PE instructors, but due to external motives, the workshop was not implemented as intended. Instead, it became a feedback session where the PE instructors made comments, suggestions and complaints on how the program was being implemented.

**Monitoring:**
- DGEF sent PE sector chiefs a list of PE instructors’ assistance.

**Data collection instruments used:**

- A) Reports
- B) Official documents
- C) Power point presentations
- D) Questionnaires
- E) Monitoring reports
- F) Meeting minutes
- G) Field work diaries
- H) Other (specify)
I) Interviews → Santiago Henao

Notes/Comments/Observations
**Description of the Intervention**

**Section I:**

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<tr>
<td>Year:</td>
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</tr>
</tbody>
</table>

**Type and Intensity of the Intervention:** Basic Plus

**Name of the intervention:** Interpersonal communication strategies

- Workshop for teachers: sensitizing and promoting healthy lifestyles

**Intervention objectives:**

Sensitizing the participants on the importance of developing healthy lifestyles, and therefore continue with program implementation.

**Key actors involved:**

INSP personnel, Ogali/PCI (outsourcing), AFSEDF, DEGOSE, DGEF, sector chiefs

**Target group:**

Teachers, PE instructors, school principal, school supervisors

**Length of the intervention (duration):**

Four days. The fifteen intervention schools were divided into 4 groups (4 schools per group). Each group received a 1 day workshop from 7:00 am - 12:30 pm

**Description of the intervention:**

**Permits/Negotiations:**

The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.

The INSP held several negotiations with MoE authorities where the agreement reached stated that the MoE, AFSEDF, DGOSE and DGEF would be in charge of food and PA strategies, while the INSP would be in charge of communication strategies and of monitoring.

AFSEDF, DEGOSE and DGEF requested PE instructors and classroom teachers to attend sensitizing workshop which was held in the INSP.

**Strategy implementation guidelines:**

The first workshop activity is participant’s registration. The maximum number was 25 participants per workshop.

Following this, came an optional part of the workshop that consisted of taking measurements (height, weight, weight and hip circumference, blood pressure and blood glucose levels). All measurements were taken by INSP nurses and nutritionists. Teachers had to sign a consent form. The information was confidential.

After the participants were measured, breakfast was served for everyone.

Once breakfast was over, the workshop implementers from Ogali and PCI were introduced as the experts in educational and healthy eating strategies for children and teachers.

Following this brief introduction, every participant introduced him/herself.

Ogali/PCI experts explained the workshop objectives and asked participants about their expectations.

After this, a short video containing pictures from program implementation was shown. Participants commented on the video and about their experiences with the program.

Following the video and comments, the results for first year of program implementation were presented by an INSP researcher.
Once the results were presented, there was 10 minutes for an “active break” during which the teachers participated in a PA routine. Then, they were asked how they felt after the “active break.”

After the pause, the participants filled in a questionnaire concerning their PA and diet habits. Each participant graded his/her own questionnaire. Following this, the results from the initial measurements were presented and compared with ENSANUT stats. Participants could comment on the results.

The next activity consists on imagining how a healthy school environment should be. Participants would receive markers and paper to draw and write down their ideas. The next step was for everyone to think of something they could do or change to achieve this ideal environment. To complement this part of the workshop a presentation of the Mexican dietary guidelines “El Plato del Bien Comer” was given.

The final part of the seminar was for participants to draw conclusions concerning all workshop aspects and to evaluate the session.

**Monitoring:**
None mentioned.

**Data collection instruments used:**

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Other (specify)

**Notes/Comments/Observations**
Description of the Intervention

Section I:

Strategy code: 22  Setting: INSP  Year: 2

Type and Intensity of the Intervention: Basic  Plus

Name of the intervention:
Interpersonal communication strategies

Activation routine training workshops for PE instructors

Intervention objectives:
For PE instructors to learn or reinforce their knowledge on how to conduct an activation routine

Key actors involved:
DEGF/AFSEDF/SMDEF, PE sector chiefs, INSP personnel

Target group:
PE instructors

Length of the intervention (duration):
1 day

Description of the intervention:

Permits/Negotiations:
The INSP presented the results for the first year of program implementation to MoE, AFSEDF and DGOSE authorities. Also, INSP sensitized all authorities on the importance of continuing with the program.

DGEF was in charge of conducting this workshop.

AFSDEF granted approval for strategy implementation. DGEF petitioned PE sector chiefs to allow PE instructors assistance to the training workshop.

Letter from INSP program coordinator notifying school principal about strategy implementation

Strategy implementation guidelines:
This training workshop was only given to PE instructors from plus schools. The workshop consisted of two parts: one was theoretical, where a presentation about the activation routine was made, and the other was practical, which consisted of demonstrations and exercises.

The training workshop was conducted by DGEF personnel.

INSP personnel in charge of monitoring the activation routine strategy was also present during training session in order for them to know more about the activation and know what aspects they have to observe during monitoring.

Monitoring:
None mentioned.

Data collection instruments used:

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes
G) Field work diaries
H) Other (specify)
I) Interviews → Santiago Henao
Description of the Intervention

Section I: Instruction for the data collection personnel

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<th>Intervention code: 23</th>
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<td>Name of the intervention:</td>
<td>Interpersonal communication strategies</td>
<td></td>
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<tr>
<td></td>
<td>Bimestrial attendance to schools' technique council meetings</td>
<td></td>
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</tbody>
</table>

Intervention objectives:
Generate awareness among teachers, PE instructors, members of the canteen committee and the principal on the importance of students participating in physical activities and eating a healthy diet in order to achieve a healthy lifestyle.

Key actors involved:
INSP personnel

Target group:
School principal, teachers, canteen committee, PE instructors

Length of the intervention (duration):
October 2007 - June 2008

Description of the intervention:

Permits/Negotiations:
School principal’s authorization to attend technique council meetings

Intervention guidelines:
During the first technique council meeting the INSP staff members presented the results from the first year and gave an explanation of the strategies for the second year and how they were going to be implemented. The school staff was weighed and measured during this session.

During the second session, the INSP staff members gave a presentation about stress and about how and why people presented this condition. They also gave the school staff a questionnaire for them to fill out in order to evaluate their level of stress.

The third session was destined to give out the results obtained from the second’s session questionnaire.

Also during these meetings, issues about strategy implementations were brought up and discussed with the teachers, principal and members of the canteen committee.

Monitoring:
Transcripts of these meetings were made to monitor strategy implementation progress.

Data collection instruments used:
A) Reports
B) Official documents
C) Power point Presentations
D) Questionnaires
E) Monitoring reports
F) Meeting Minutes
G) Field work diaries
H) Other (specify)

I) Interviews → Elena Espinosa, Catalina Medina, Eduardo Thébar, Arlette Ramírez

Notes/Comments/Observations
Description of the Intervention

Section I:

Strategy code: 24  Setting: 2

Type and Intensity of the Intervention: Basic Plus

Name of the intervention: Network connections, written authorizations and memorandums

Intervention objectives:
Describe how negotiations and permits and authorizations were obtained with the main authorities to implement strategies in the school.

Key actors involved:
INSP, MoE, school authorities

Target group:
INSP, MoE: AFSEDF, DGOSE, DGEF, school authorities: canteen committee, technique council, school principal

Length of the intervention (duration):
2007-2008

Description of the intervention:
INSP authorities held several meetings with MoE/AFSEDF authorities in order to negotiate the implementation of food and PA strategies for the second year of the program. These negotiations resulted in the following:

MoE/AFSEDF authorities gave an order to create a committee which would be in charge of strategy implementation in all intervention schools. Throughout the entire year, the INSP held reunions with this committee in order to obtain feedback on strategy implementation. All consensus reached during these meetings by both parties, the INSP and the MoE, were registered in official documents. These documents were sent to the schools via the MoE, dictating an order to implement all food and PA strategies.

This agreement was vital for the second year of the program because it gave the program official validity. The INSP was no longer directly responsible to negotiate with school authorities to implement food and PA strategies in the schools.

Data collection instruments used:

A) Reports

B) Official documents

C) Power point presentations

D) Questionnaires

E) Monitoring reports

F) Meeting minutes

G) Field work diaries

H) Interviews
In order to be able to implement all program strategies in the schools, the INSP had to abide to MoE’s terms and hierarchical structure.
Appendix D

MANUSCRIPT 4
Ethics approvals; letters of information and consent forms for students and personnel at school; and, questionnaires.
July 16, 2013

Dr. Lucie Levesque
Associate Professor
School of Kinesiology & Health Studies
Queen's University
511 Union Street
Kingston, ON K7L 3N6

Dear Dr. Levesque:

GREB Romeo #: 6006044
Title: "GPHE-107-11 National Guidelines for the prevention of obesity in the Mexican School System: An investigation of policy implementation and impact" (Dr. Lee's title. Understanding Health Habits in Mexican Children* added via approved amendment Mar 16/12)*

The General Research Ethics Board (GREB) has reviewed and approved your request for renewal of ethics clearance for the above-named study. This renewal is valid for one year from July 12, 2011. Prior to the next renewal date you will be sent a reminder memo and the link to ROMEO to renew for another year.

You are reminded of your obligation to advise the GREB of any adverse event(s) that occur during this one year period. An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours. Report to GREB through either ROMEO Event Report or Adverse Event Report Form at http://www.queenu.ca/or/researchethics/GeneralGREB/forms.html.

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example you must report changes in study procedures or implementation of new aspects into the study procedures. Your request for protocol changes will be forwarded to the appropriate GREB reviewers and/or the GREB Chair. Please report changes to GREB through either ROMEO Event Reports or the Ethics Change Form at http://www.queenu.ca/or/researchethics/GeneralGREB/forms.html.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

[Signature]

Jean Stevenson, Ph.D.
Professor and Chair
General Research Ethics Board

c.: Dr. Rebecca Lee, Dr. Simon Barquera, and Ms. Margarita Safdie, Co-investigators
Dr. Spencer Moore, Chair, Unit REB
Jonie Birkchall, Dept. Admin.
July 12, 2011

Dr. Lucie Lévesque
School of Kinesiology and Health Studies
Queen’s University
28 Division Street
Kingston, ON K7L 3N6

Dear Dr. Lévesque:

GREB Ref #: GPHE-107-11

The General Research Ethics Board (GREB), by means of a full board review, has cleared your proposal entitled “National Guidelines for the Prevention of Obesity in the Mexican School System: An Investigation of Policy Implementation and Impact” for ethical compliance with the Tri-Council Guidelines (2nd edition) (TCPS 2) and Queen’s ethics policies. In accordance with the Tri-Council Guidelines (Article 6.14), your project has been cleared for one year. At the end of each year, the GREB will ask if your project has been completed and if not, what changes have occurred or will occur in the next year.

You are reminded of your obligation to advise the GREB, with a copy to your unit REB, if applicable, of any adverse event(s) that occur during this one year period (details available on webpage http://www.queensu.ca/ors/researchethics/GeneralREB/forms.html - GREB Adverse Event Report Form). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be cleared by the GREB (TCPS 2, Article 6.16). For example you must report changes to the level of risk, applicant characteristics, and implementations of new procedures on the Ethics Change Form that can be found at http://www.queensu.ca/ors/researchethics/GeneralREB/forms.html – Research Ethics Change Form. These changes must be sent to the Ethics Coordinator, Gail Irving, at the Office of Research Services or irvingg@queensu.ca prior to implementation. Your request will be forwarded to the appropriate GREB reviewers and/or the GREB Chair.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Yours sincerely,

Joan Stevenson, PhD
Professor and Chair
General Research Ethics Board

c.c.: Simon Barquera (Researcher, INSP) and Margarita Safdie (Ph.D. Candidate, SKHS), Co-Applicants
Dr. Spencer Moore, Chair Unit REB
Josie Birchall, Dept. Admin
Culiacán, Sinaloa, 23 de septiembre de 2011.
2011, Año del Turismo en México
Ct: 1625, Fto. 1107

Simon Borquera Cervera
Investigador responsable

En relación a su proyecto titulado "National Guidelines for the Prevention of Obesity in the Mexican School System: An Investigation of Policy Implementation and Impact" me complace informarle que los miembros de la Comisión de Ética le han otorgado el dictamen de:

Aprobado

Le informamos que esta aprobación tiene vigencia hasta el 22 de septiembre del 2012

Renovación anual: Si su estudio se extiende por un periodo mayor, favor de presentar el formato de Renovación anual con 45 días de anticipación a su fecha de vencimiento. Favor de solicitar vía electrónica el formato correspondiente a esta Comisión. Nota: Es responsabilidad del señor como investigador Responsable de este proyecto solicitar la renovación anual de su estudio con suficiente anticipación.

Consentimiento: Para obtener el consentimiento de los sujetos humanos de su estudio únicamente se deberán utilizar los materiales que han sido aprobados y sellados por esta Comisión.

Addenda/Modificaciones: Le recuerdo que cualquier cambio o actualización en los procedimientos de este estudio deberá ser enviado a esta Comisión previo a su implementación, utilizando el sistema SNID. El número de su proyecto es 1625 y el de esta aprobación es 1107. Le pedimos hacer referencia a estos números para cualquier correspondencia futura.

Le agradecemos su cooperación y compromiso con la protección de los derechos de los sujetos humanos en la investigación.

Atentamente

Dra. Julieta Ivonne Castro Romero
Presidente
"Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional"

CARTA DE INFORMACIÓN PARA LOS DIRECTORES DE ESCUELAS PRIMARIAS

Estimado (nombre del director),

Le escribimos para informarle en qué consiste el proyecto de investigación titulado: "Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional", que se realizará en la escuela primaria que está a su cargo. Como es de su conocimiento, el Acuerdo Nacional para la Salud Alimentaria: Estrategia contra el sobrepeso y la obesidad, contiene acciones dirigidas especialmente a los menores de edad, en forma individual, comunitaria y nacional, que permitan mejorar la oferta y el acceso a alimentos y bebidas favorables para la salud. Así como la promoción de la práctica de actividad física constante a lo largo de las diferentes etapas de la vida. Como parte de esta estrategia, se desarrolló el Programa de Acción en el Contexto Escolar que tiene como objetivo facilitar y promover una alimentación correcta y el impulso de la actividad física dentro de los planteles de educación básica.

El objetivo principal de esta investigación es evaluar las condiciones ambientales de los niños en la escuela. Específicamente nos interesa conocer la disponibilidad y acceso de los escolares a alimentos y registrar el tipo de actividad física que realizan durante su estadía en la escuela. Los resultados serán de utilidad para mejorar los programas que se están implementando para promover la salud infantil.

Esta investigación ha sido aprobada por la Comisión de Ética de la Universidad de Queens y el Comité de Ética del Instituto Nacional de Salud Pública, además, cuenta con el apoyo de la Secretaría de Salud (Dirección General de Promoción de la Salud y de la Dirección de Estrategias y Desarrollo de Entornos Saludables), y la Secretaría de Educación Pública (Subsecretaría de Educación Básica, Dirección General de Desarrollo de la Gestión e Innovación Educativa, Dirección de Innovación Educativa).

Su escuela ha sido seleccionada para participar en este proyecto, porque es una escuela pública y en ella se están implementando el Programa de Acción en el Contexto Escolar. Por ello, estamos solicitando su apoyo y su participación para realizar este trabajo, mediante el acceso a los estudiantes matriculados en los grados de 3º a 5º grado, el acceso a sus instalaciones y la aplicación de algunas herramientas de investigación que incluye la participación de profesores, vendedores y alumnos. La descripción de cada uno de los instrumentos que se van a utilizar durante el estudio se describen en el anexo A, de este documento. Por último, le comentamos que la investigación se va a llevar a cabo en dos etapas:

**ETAPA 1.** En otoño (Septiembre-Octubre) de 2011, se le pedirá que nos permita acceder a los grupos de 3º a 5º grado, para realizar la distribución de las cartas de consentimiento informado a niños y sus padres de familia. Asistentes de este proyecto visitarán su escuela para llevar a cabo observaciones y medidas antropométricas (altura, peso y circunferencia de cintura) a los niños. Las visitas para recolectar la información, se programaran considerando su opinión y se realizarán dentro de la escuela. Por favor, tome en cuenta que le solicitaremos un espacio para realizar las mediciones. Además, nos interesa conocer los horarios de las clases de Educación Física y observaremos las condiciones del lugar en el que se preparan y

Número de registro ante la Comisión de Investigación del INSP:
venden los alimentos, así como las instalaciones en las que se realiza actividad física y el consultorio o lugar en donde se proporcionan los servicios de salud.

**ETAPA 2.** En la primavera (Marzo-Mayo) de 2012, los asistentes de investigación del INSP regresarán a su escuela y seguirán el mismo protocolo, descrito en la etapa 1, a los estudiantes que hayan consentido participar en el estudio. Además, durante esta etapa, se realizarán grupos de discusión con profesores, personas que participan en la preparación de alimentos, miembros del comité de cooperativas y usted. En los grupos focales pueden participar entre 6 y 10 personas, con un moderador encargado de hacer preguntas, y dirigir la discusión, sobre temas que describan las condiciones del ambiente escolar (físico y social) que permiten, facilitan o limitan la aplicación de la política nacional.

Le comentamos que las escuelas que participen, **no recibirán dinero a cambio**, tampoco los padres o niños, pero no les costará nada participar y en cambio, la información que proporcionen a esta investigación será de gran utilidad para generar evidencia que apoye a los tomadores de decisiones en torno al Programa de Acción en el Contexto Escolar. Así mismo, le informamos que se mantendrá **absoluta confidencialidad** de toda la información que se genere, las únicas personas que tendrán acceso a esta información serán los investigadores. Los resultados se reportarán de manera global, de modo que no se identificaran los datos por escuela.
Anexo A. Descripción de los instrumentos de medición que se utilizará en las escuelas para desarrollar el proyecto: “Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional”.

1. **Formato de antropometría.** En este formato se registrará el resultado de las mediciones de los niños: peso, talla y circunferencia de cintura, las mediciones no son invasivas y las realizará personal capacitado. Este formato también incluye los datos para identificar al niño, como los datos de la escuela, fecha de observación, nombre del niño, grado y grupo, sexo, fecha de nacimiento y los resultados de las mediciones.

2. **Formato de observación de instalaciones y material para actividad física.** La primera sección de este formato contiene los datos para identificar la escuela. En la segunda parte se registrara el tipo de juegos con los que cuentan los niños, ya sea dibujados en el piso (por ejemplo el avión) o físicos, como porterías, canastas de basquetbol, redes para vóley bol, así mismo se registrará información de los mensajes en las paredes de la escuela con respecto a la alimentación y actividad física. En la última sección se va a registrar el mobiliario deportivo con el que cuenta la escuela para realizar actividad física.

3. **Formato de observación del consumo de alimentos y bebidas en clase.** En este formato se recabará toda la información disponible sobre el consumo de alimentos de los niños durante su estancia en el salón de clases, antes y después del recreo. La primera parte contiene los datos de identificación de los niños. En las siguientes secciones se colocarán los resultados de la observación del consumo de alimentos y bebidas durante la clase y antes y después del recreo. También se registrará el comportamiento del docente ante el consumo de alimentos y/o bebidas en clase, es decir, se registrará si el docente hace algún comentario a los niños sobre el consumo de alimentos y/o bebidas. En este formato se registrará información sobre el consumo de agua dentro del salón de clase, antes y después del recreo.

4. **Formato de observación de inventario de puestos, alimentos, bebidas y agua.** En este formato se registrará el número de puestos de comida dentro de la escuela. La primera sección contiene los datos de identificación de la escuela. En la segunda sección se registrará la información de los proveedores de alimentos que se colocan dentro de la escuela a la hora del recreo, espacio que ocupan y tipo de alimentos que se preparan. Además se preguntarán los datos sobre la preparación de los alimentos. En otra sección se registrará el número de bebederos o agua disponible de forma gratuita dentro de la escuela.
"Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional"

CONSENTIMIENTO INFORMADO PARA LOS PADRES DE FAMILIA

Estimado Padre / Madre o tutor,

Su hijo (a) podría ser seleccionado para participar en el proyecto de investigación titulado: “Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional” que se realizará en la escuela primaria a la que asiste su hijo (a). El estudio se realizará para conocer los alimentos que se venden dentro de la escuela y la actividad física que realizan los niños mientras están en la escuela.

Para ello, vamos a realizar observaciones en la escuela de su hijo (a), veremos qué tipo de alimentos se consumen a la hora del recreo, tanto los alimentos que traen de casa, como los que se preparan y venden en la escuela. También observaremos las actividades que se realizan durante la clase de educación física y durante el recreo y se llevará un registro de esta información.

Esta investigación ha sido aprobada por la Comisión de Ética de la Universidad de Queens y del Instituto Nacional de Salud Pública, además, cuenta con el apoyo de la Secretaría de Salud, la Secretaría de Educación Pública y el director de su escuela.

Nos gustaría tener su permiso para recopilar información específica de su hijo. A su niño (a) también se le pedirá su consentimiento en el momento de la recolección de datos y pueden negarse a participar en cualquier momento.

Si usted da el consentimiento para que su hijo participe, nosotros realizaremos las siguientes actividades:

1) Observaremos el consumo de alimentos de su hijo (a) y le haremos algunas preguntas sobre su almuerzo, como qué come y bebe durante el recreo.

2) Realizaremos las siguientes mediciones antropométricas: altura, peso y circunferencia de cintura, todas las mediciones se harán con ropa y se realizarán en el salón que nos indique la Dirección. Las mediciones las realizarán dos asistentes del estudio entrenados del INSP, estas mediciones durarán aproximadamente 15 minutos.

Estas evaluaciones se realizarán dos veces: una en otoño (Septiembre-Octubre) de 2011 y otra en primavera (Marzo-Mayo) de 2012.

Riesgos

No existe ningún tipo de riesgo asociado a la participación en este estudio y la participación de su hijo (a) es absolutamente voluntaria. Usted o/y su hijo (a) son libres de negarse a participar o retirarse en cualquier momento.

Número de registro ante la Comisión de Investigación del INSP:
Beneficios
Si usted está de acuerdo en que su hijo (a) participe en la realización de este estudio, usted estará ayudando al INSP, a la Secretaría de Salud y a la Secretaría de Educación Pública a obtener información que ayude a prevenir y combatir el problema de sobrepeso y obesidad infantil. Si usted decide que su hijo (a) no participe en el estudio, no habrá ninguna consecuencia negativa para usted ni para su hijo (a) en la escuela.

Confidencialidad / Anonimato
Para nosotros es importante proteger la confidencialidad de la información que se recibe de los estudiantes que participen en este estudio. A continuación le indicaremos como lo haremos:

1. Aunque se va a registrar el nombre de los estudiantes para realizar la comparación de las mediciones, los nombres de los niños y las escuelas se van a mantener por separado, asignando un número a cada participante y cada escuela.
2. Los datos serán protegidos en las instalaciones del INSP y la Universidad de Queens y sólo estarán disponibles para los miembros del equipo de investigación.
3. Los resultados del estudio se presentarán en diversas publicaciones relacionadas con salud y actividad física, en conferencias, pero siempre resguardando la identidad de los participantes.
4. La información que se obtenga de ningún modo será utilizada para evaluar académicamente a su hijo.

Contacto
Si usted requiere mayor información, no dude en comunicarse con el Dr. Simón Barquera al teléfono 54 87 10 00 ext. 4144/4297 o escribir un correo electrónico a la siguiente dirección: simon.barquera@gmail.com o a la Dra. Lévesque a la siguiente dirección: levesqu@queensu.ca

Si usted tiene preguntas generales acerca de sus derechos como participante de un estudio de investigación, puede comunicarse con la Presidenta de la Comisión de Ética de este Instituto, Dra. Julieta Ivone Castro, al teléfono: 01 (777) 329-30-00 extensión 7424 de lunes a viernes de 8:30 a 16:30 hrs. O si prefiere puede usted escribirle a la siguiente dirección de correo: etica@correo.insp.mx o al presidente del Comité de Ética de la Universidad de Queens, Dr. Joan Stevenson a la siguiente dirección electrónica: chair.GREB@Queensu.ca Este estudio ha sido diseñado de acuerdo a los lineamientos del Comité de Ética de Canadá y las políticas de la Universidad de Queens, así como a los lineamientos del Comité de Ética del INSP.

Número de registro ante la Comisión de Investigación del INSP:

Comisión de Ética
Instituto Nacional de Salud Pública
Versión Aprobada: Septiembre 23, 2011
Proyecto: CI: 1025, Folio Identificador: Q69
Copia sellada en archivo

386
CONSENTIMIENTO:

HE LEÍDO Y COMPRENDIDO LA INFORMACIÓN DE ESTE ESTUDIO Y ACEPTO QUE MI HIJO (A) PARTICIPE EN SU REALIZACIÓN.

NOMBRE DEL NIÑO (A): _________________________________________________________________

GRADO y GRUPO: _____________________________

NOMBRE DEL PADRE O MADRE O TUTOR DEL MENOR: _________________________________

FIRMA DEL PADRE O MADRE O TUTOR DEL MENOR: _________________________________

NOMBRE DEL ENTREVISTADOR: ________________________________

FIRMA DEL ENTREVISTADOR: ________________________________

FECHA: ________________________________

Por favor devuelva este formulario de consentimiento a la escuela de su hijo (a) antes de esta fecha: ________________________________
“Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional”

CARTA DE ASENTIMIENTO INFORMADO PARA LOS NIÑOS
(Se leerá a los niños cuyos padres hayan firmado la carta de consentimiento)

Te estamos invitando...

Te invitamos a formar parte de un estudio de investigación para conocer sobre los alimentos que consumen los niños y la actividad física que realizan mientras están en la escuela.

¿Por qué te invitamos a formar parte de nuestro estudio?

Te invitamos a ser parte de nuestro estudio porque tienes entre 8 y 11 años y vas en 3° o 4° o 5° año de primaria y vas a una escuela pública de la Ciudad de México. Si estás de acuerdo en participar, nosotros realizaremos las siguientes actividades:

1. Observaremos y anotaremos los alimentos y bebidas que consumes en el salón de clases y durante el recreo y te haremos algunas preguntas muy sencillas sobre el tema.
2. En un salón que nos indique la Dirección tomaremos medidas de tu altura, peso y circunferencia de cintura. Todas las mediciones se harán con ropa y se realizarán por dos asistentes de nuestro equipo. Ninguno de tus compañeros estará presente al momento de realizar estas mediciones. El proceso dura 15 minutos aproximadamente, y se harán en el horario de clases. Todas estas actividades se realizarán bajo el permiso de los directivos de la escuela. No necesitamos sacarte sangre, ni te van a revisar la boca o vacunar.

Nadie de tu salón o escuela (profesor, director o compañeros de clase) podrá saber lo que tú contestaste, ni tu peso, ni tu estatura, ni la medida de tu cintura, es decir, tu información será secreta. Tú participación es voluntaria y debes saber que aunque tus papás nos han dado permiso para preguntarte si quieres participar, si tú no quieres hacerlo está bien, respetaremos lo que tú nos digas. En caso de que decidas no participar, no habrá ninguna consecuencia negativa en tus estudios ni tendrás problemas con tu profesor o director por esta razón.

No hay un beneficio directo para ti por participar en este estudio, sin embargo la información que proporciones nos ayudará a saber cómo mejorar la salud de los niños de tu edad.

Por favor marca con una X en el cuadro que corresponda, si aceptas o no participar.

<table>
<thead>
<tr>
<th>Acepto participar</th>
<th>No acepto participar</th>
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</table>

TÚ NOMBRE: __________________________________________________________
NOMBRE DE LA ESCUELA: _____________________________________________
GRADO Y GRUPO: ___________________________________________________
NOMBRE Y FIRMA DEL ENTREVISTADOR: _________________________________
FECHA: ________________________________

Comisión de Ética
Instituto Nacional de Salud Pública
Versión Aprobada: Septiembre 23, 2011
Proyecto: Q9
Copia sellada en archivo

Número de registro ante la Comisión de Investigación del INSJ:
“Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional”

CARTA PARA RECLUTAR AL PERSONAL DE LA ESCUELA

Como es de su conocimiento, el Acuerdo Nacional para la Salud Alimentaria: Estrategia contra el sobrepeso y la obesidad, contiene acciones dirigidas especialmente a los menores de edad, en forma individual, comunitaria y nacional, que permitan mejorar la oferta y el acceso a alimentos y bebidas favorables para la salud, así como la promoción de la práctica de actividad física constante a lo largo de las diferentes etapas de la vida. Como parte de esta estrategia, se desarrollaron los “Lineamientos generales para el Expendio o Distribución de Alimentos y Bebidas en los establecimientos de consumo escolar de los planteles de educación básica” que tienen como objetivo facilitar y promover una alimentación correcta y el impulso de la actividad física dentro de los planteles de educación básica.

Con el objetivo de evaluar la implementación de los Lineamientos en las escuelas, nos gustaría invitarlo a participar en una reunión con personal de otras escuelas públicas, que también participan en el estudio, para hablar de su experiencia con la implementación de los Lineamientos en su escuela. La información que nos proporcione servirá para identificar ventajas, obstáculos y retos a los que se han enfrentado durante la implementación de los Lineamientos en el ámbito escolar. Si usted decide no participar en el estudio, no habrá ninguna consecuencia negativa para usted ni en su trabajo.

Si usted está interesado en conocer más sobre esta oportunidad de compartir su experiencia, por favor, proporcione su información de contacto y hora de reunión preferida y nosotros nos comunicaremos con usted.

NOMBRE: ________________________________

INFORMACIÓN DE CONTACTO:

Teléfono: ________________________________

Correo electrónico: __________________________

Comisión de Ética

Instituto Nacional de Salud Pública
Versión Aprobada: Septiembre 23, 2011
Proyecto: CI-1025, Folio Identificador: Q06

Copia sellada en archivo

Número de registro ante la Comisión de Investigación del INSP:
“Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional”

CARTA DE INFORMACIÓN PARA GRUPOS DE DISCUSIÓN (FOCAL) INFORMANTES CLAVE Y PERSONAL DE LA ESCUELA

Como es de su conocimiento, los “Lineamientos generales para el Expendio o Distribución de Alimentos y Bebidas en los establecimientos de consumo escolar de los planteles de educación básica” tienen como objetivo facilitar y promover una alimentación correcta y el impulso a la actividad física dentro de los planteles de educación básica. El objetivo principal de esta investigación es evaluar las condiciones ambientales de los niños en la escuela. Específicamente nos interesa conocer la disponibilidad y acceso de los escolares a alimentos y registrar el tipo de actividad física que realizan durante su estancia en la escuela. Los resultados serán de utilidad para mejorar los programas que se están implementando para promover la salud infantil. Esta investigación ha sido aprobada por la Comisión de Ética de la Universidad de Queens y el Comité de Ética del INSP, además, cuenta con el apoyo de la Secretaría de Salud y la Secretaría de Educación Pública.

¿En que consistirá su participación?

Usted ha sido seleccionado para participar en este proyecto porque trabaja en una escuela pública y en ella se están implementando los Lineamientos. Su participación consistirá en asistir a una reunión con personal de otras escuelas públicas, que también participan en el estudio, para hablar de su experiencia con la aplicación de los Lineamientos en su escuela. La reunión tendrá una duración aproximada de 90 minutos y será grabada en audio. La reunión se programará en el momento que sea adecuado para su escuela y para ustedes. Le pediremos que describa las ventajas y los problemas a los que se han enfrentado para la implementación de los Lineamientos en las escuelas, las soluciones que han encontrado, las barreras y las oportunidades que han tenido, etc. Si usted decide no participar en el estudio, no habrá ninguna consecuencia negativa para usted ni en su trabajo.

Riesgos

No existe ningún tipo de riesgo asociado a la participación en este estudio y su participación es absolutamente voluntaria. Usted es libre de negarse a contestar cualquier pregunta. Usted es libre de negarse a participar o retirarse en cualquier momento, informando al personal del equipo que estará en contacto con la escuela.

Beneficios

Si usted está de acuerdo en participar en la realización de este estudio, usted estará ayudando al INSP, a la Secretaría de Salud y a la Secretaría de Educación Pública a obtener información sobre la implementación de los Lineamientos en las escuelas para prevenir y combatir el problema de sobrepeso y obesidad infantil.

Confidencialidad / Anónimo

Para nosotros es importante proteger la privacidad de los que participen en esta investigación. A continuación le indicaremos como lo haremos:

1. Su nombre no será registrado. Sólo a las escuelas se les va asignar un número para vincular los datos con la escuela en la que trabaja.

Número de registro ante la Comisión de Investigación del INSP:

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2. La transcripción de la reunión se realizará a puertas cerradas en las instalaciones del INSP y sólo estarán disponibles para los responsables de la investigación, la Dra. Lucie Lévesque y el Dr. Simón Barquera. Los datos electrónicos serán protegidos con una contraseña.

3. La Dra. Lucie Lévesque y el Dr. Simón Barquera serán los responsables del acceso a los datos para futuras investigaciones.

4. Los resultados del estudio se presentarán en diversas publicaciones relacionadas con salud y actividad física, en conferencias, pero siempre manteniendo la confidencialidad de los participantes.

5. La información que se obtenga de ningún modo será utilizada para evaluar su desempeño como director, profesor o personal de su institución.

Contacto
Si usted requiere mayor información, no dude en comunicarse con el Dr. Simón Barquera al teléfono 54 87 10 00 ext. 4144/4297 o escribir un correo electrónico a la siguiente dirección: simon.barquera@gmail.com o a la Dra. Lévesque a la siguiente dirección: levesquil@Queensu.ca

Si usted tiene preguntas generales acerca de sus derechos como participante de un estudio de investigación, puede comunicarse con la Presidenta de la Comisión de Ética de este Instituto, Dra. Julieta Ivone Castro, al teléfono: 01 (777) 329-30-00 extensión 7424 de lunes a viernes de 8:30 a 16:30 hrs. O si prefiere puede usted escribirle a la siguiente dirección de correo: etica@correo.insp.mx o al presidente del Comité de Ética de la Universidad de Queens, Dr. Joan Stevenson a la siguiente dirección electrónica: chair.GREB@queensu.ca Este estudio ha sido diseñado de acuerdo a los lineamientos del Comité de Ética de Canadá y las políticas de la Universidad de Queens, así como a los lineamientos del Comité de Ética del INSP.

CONSENTIMIENTO:

HE LEIDO Y COMPRENDIDO LA INFORMACIÓN DE ESTE ESTUDIO Y ACEPTO PARTICIPAR EN EL GRUPO DE DISCUSIÓN (FOCAL).

NOMBRE: __________________________________________

FIRMA: __________________________________________

NOMBRE DE LA ESCUELA: _________________________________

GRADO: ________________________ FECHA: _______________

NOMBRE Y FIRMA DEL ENTREVISTADOR: __________________________

Comisión de Ética
Instituto Nacional de Salud Pública
Versión Aprobada: Septiembre 23, 2011
Proyecto: CL 1025, Folio Identificador: Q69
Copia sellada en archivo

Número de registro ante la Comisión de Investigación del INSP: 391
“Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional”

CARTA DE INFORMACIÓN PARA ENTREVISTA CERRADA A INFORMANTES CLAVE Y PERSONAL DE LA ESCUELA DE LA COOPERATIVA

Como es de su conocimiento, el Programa de Acción en el Contexto Escolar tiene como objetivo facilitar y promover una alimentación correcta y el impulso a la actividad física dentro de los planteles de educación básica. El objetivo principal de esta investigación es evaluar las condiciones ambientales de los niños en la escuela. Específicamente nos interesa conocer la disponibilidad y acceso de los escolares a alimentos y registrar el tipo de actividad física que realizan durante su estancia en la escuela. Los resultados serán de utilidad para mejorar los programas que se están implementando para promover la salud infantil. Esta investigación ha sido aprobada por la Comisión de Ética de la Universidad de Queens y el Comité de Ética del INSP, además, cuenta con el apoyo de la Secretaría de Salud y la Secretaría de Educación Pública.

¿En qué consistirá su participación?

Usted ha sido seleccionado para participar en este proyecto porque ocupa un papel sumamente importante dentro del comité de cooperativas de su escuela donde se está implementando el Programa. Su participación consistirá en contestar un cuestionario que le será aplicado por una persona del Instituto Nacional de Salud Publica. El objetivo de la entrevista es conocer de qué forma se está ejecutando el Programa de Acción en el Contexto Escolar y los Lineamientos para la distribución y venta de alimentos en su escuela. La entrevista tendrá una duración aproximada de 30 minutos y no será grabada en audio. La entrevista se programará en el momento que sea adecuado para usted. Le pediremos que describa la forma en la cual se ejecuta el Programa de Acción en el Contexto Escolar y los problemas a los que se han enfrentado para su implementación. Además conoceremos como ha sido su ejecución desde el punto de vista del proceso. La entrevista se hará al inicio y al termino del estudio y se llevará a cabo dentro de la escuela en horario de clases. Si usted decide no participar en el estudio, no habrá ninguna consecuencia negativa para usted ni en su trabajo.

Riesgos

No existe ningún tipo de riesgo asociado a la participación en este estudio y su participación es absolutamente voluntaria. Usted es libre de negarse a contestar cualquier pregunta. Usted es libre de negarse a participar o retirarse en cualquier momento, informando al informando al personal del equipo que estará en contacto con la escuela.

Beneficios

Si usted está de acuerdo en participar en la realización de este estudio, usted estará ayudando al INSP, a la Secretaría de Salud y a la Secretaría de Educación Pública a obtener información sobre la implementación de los Lineamientos en las escuelas para prevenir y combatir el problema de sobrepeso y obesidad infantil.
Confidencialidad / Anonimato
Para nosotros es importante proteger la privacidad de los que participen en esta investigación. A continuación le indicaremos como lo haremos:

1. Su nombre no será registrado. Sólo a las escuelas se les va asignar un número para vincular los datos con la escuela en la que trabaja.
2. La captura de la entrevista se realizará a puertas cerradas en las instalaciones del INSP y sólo estarán disponibles para los responsables de la investigación, la Dra. Lucie Lévesque y el Dr. Simón Barquera. Los datos electrónicos serán protegidos con una contraseña.
3. La Dra. Lucie Lévesque y el Dr. Simón Barquera serán los responsables del acceso a los datos para futuras investigaciones.
4. Los resultados del estudio se presentarán en diversas publicaciones relacionadas con salud y actividad física, en conferencias, pero siempre manteniendo la confidencialidad y el anonimato de los participantes.
5. La información que se obtenga de ningún modo será utilizada para evaluar su desempeño como miembro del comitee de cooperativa, profesor o personal de su institución.

Contacto
Si usted requiere mayor información, no dude en comunicarse con el Dr. Simón Barquera al teléfono 54 87 10 00 ext. 4144/4297 o escribir un correo electrónico a la siguiente dirección: simon.barquera@gmail.com o a la Dra. Lévesque a la siguiente dirección: levesqu@Queensu.ca

Si usted tiene preguntas generales acerca de sus derechos como participante de un estudio de investigación, puede comunicarse con la Presidenta de la Comisión de Ética de este Instituto, Dra. Julieta Ivone Castro, al teléfono: 01 (777) 329-30-00 extensión 7424 de lunes a viernes de 8:30 a 16:30 hrs. O si prefiere puede usted escribirle a la siguiente dirección de correo: etica@correoinsp.mx o al presidente del Comité de Ética de la Universidad de Queens, Dr. Joan Stevenson a la siguiente dirección electrónica: chair.GREB@queensu.ca Este estudio ha sido diseñado de acuerdo a los lineamientos del Comité de Ética de Canadá y las políticas de la Universidad de Queens, así como a los lineamientos del Comité de Ética del INSP.

CONSENTIMIENTO:
HE LEIDO Y COMPRENDIDO LA INFORMACIÓN DE ESTE ESTUDIO Y ACEPTO PARTICIPAR EN EL GRUPO DE DISCUSIÓN (FOCAL).

NOMBRE: ____________________________________________________________
FIRMA: ____________________________________________________________

NOMBRE DE LA ESCUELA: __________________________________________

GRADO: ____________________   FECHA: ________________________

NOMBRE Y FIRMA DEL ENTREVISTADOR: ________________________________

Número de registro ante la Comisión de Investigación del INSP:

Comisión de Ética
Instituto Nacional de Salud Pública
Versión Aprobada: Septiembre 23, 2011
Proyecto: CH 1055, Folio Identificador: D664
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“Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional”

ACUERDO DE CONFIDENCIALIDAD
Personal del proyecto

Yo (Nombre del personal) entiendo mis deberes y responsabilidades como miembro del equipo del proyecto de investigación: “Lineamientos generales para la prevención de la obesidad en el Sistema Escolar Mexicano: Una investigación de la implementación e impacto de la política nacional”. Me comprometo a mantener en confidencialidad toda la información sobre este proyecto y no revelar ningún dato o información personal sobre los participantes del estudio a nadie más que a personas autorizadas del INSP y de la Universidad de Queens.

NOMBRE DEL ENTREVISTADOR: ____________________________

FIRMA DEL ENTREVISTADOR: ____________________________

FECHA: ________________

Comisión de Ética
Instituto Nacional de Salud Pública
Versión Aprobada: Septiembre 23, 2011
Proyecto: CI: 1059, Folio Identificador: D60
Copia sellada en archivo
ANEXO 3. INDICADORES DE PROCESO

INSTITUTO NACIONAL DE SALUD PÚBLICA
CENTRO DE INVESTIGACIÓN EN NUTRICIÓN Y SALUD

-- CUANTITATIVO --

Indicadores de Proceso

FICHA DE IDENTIFICACIÓN

4. Código del entrevistador |__|__|

5. Nombre de la escuela ________________________________

26. Dirección de la escuela

______________________________________________________________________________
______________________________________________________________________________

27. Código de la escuela |__|__|

28. Fecha de entrevista |__|__|__|__|__|__|
Día Mes Año

29. Etapa de estudio |__| (0. Basal, 1. Final)

30. Nombre del director:

______________________________________________________________________________

31. Turno: _______________________

32. Total de estudiantes en la escuela __________

33. Total de estudiantes de 3 a 5 grado __________

34. Numero de salones por grado 3 a 5 __________

INFORMACIÓN GENERAL DE COOPERATIVA

Localiza al encargado o presidente de la cooperativa y hazle las siguientes preguntas:

35. Nombre del entrevistado ________________________________
36. Puesto dentro del comité o escuela______________________________

37. ¿En esta escuela existe Comité del establecimiento de consumo escolar?
   1) Sí
   2) No

38. ¿Existe Consejo de Participación Escolar en la escuela?
   1) Sí
   2) No (Pase pregunta 19)

39. ¿Quién conforma el comité de establecimiento de consumo escolar?

<table>
<thead>
<tr>
<th>Nombre</th>
<th>Puesto</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

40. ¿Cada cuándo se reúne el comité de establecimiento de consumo escolar?
   _______ días

41. ¿Cuáles son las funciones del comité?
   __________________________________________________________________________
   __________________________________________________________________________
   __________________________________________________________________________

42. ¿Quién supervisa la venta de la cooperativa?
   __________________________________________________________________________

43. ¿Alguna persona dentro de la escuela evalúa el desempeño de la escuela en términos del cumplimiento de la regulación de los Lineamientos generales para el expendio o distribución de alimentos y bebidas en los establecimientos de educación básica?
   1) Sí, ¿quién?______________________________________________________________
   2) No

44. ¿Se realizan otro tipo de actividades además de los cambios en la cooperativa para cumplir con los Lineamientos?
   1) Sí, ¿cuáles?____________________________________________________________
   2) No
Localiza al maestro de educación física de la escuela y hazle las siguientes preguntas:

45. ¿Se realiza activación física dirigida en la escuela?
   1) Sí
   2) No (Pase pregunta 26)

46. ¿Cuántos días a la semana? __________

47. ¿Cuánto tiempo? __________________

48. ¿Quién la dirige?___________________

49. ¿En esta escuela se realiza recreo activo?
   1) Sí
   2) No (Pase pregunta 30)

50. ¿Cuántos días a la semana? __________

51. ¿El recreo activo es dirigido por algún profesor o personal de la escuela?
   1) Sí, ¿quién? ______________________
   2) No

52. Cuantos niños de la escuela (porcentaje o numero exacto) participan en el recreo activo?

53. ¿Cuántas clases de educación física tienen los alumnos a la semana?
   1) 1
   2) 2
   3) Otra respuesta: __________

54. Cuantas clases de educación física tienen los alumnos por grado en todo el ciclo escolar? __________

55. Las clases de educación física cumplen con el currículo/programa establecido por la SEP?
   1) 1
   2) 2
   3) Otra respuesta: __________

56. Los maestros de educación física son capacitados por la SEP?
   1) 1
   2) 2, Por quien?___________________
   3) Otra respuesta: __________

57. Cuantas clases de educación son canceladas en el ciclo escolar? ________________
58. Cuantos niños por grado en la escuela que no puede hacer educación física por alguna razón?
   ___________________

59. Existe algún programa que promueva caminar a la escuela?
   
   1) 1, cual?________
   2) 2
   3) Otra respuesta: ____________

**RECONOCIMIENTO DE LA ESCUELA**

*Localiza al director de la escuela y hazle las siguientes preguntas:*

60. ¿Existe algún código o una calificación para premiar o reconocer a las escuelas que cumplen con los lineamientos y actividad física propuesta por el programa de acción en el contexto escolar?
   
   1) Si
   2) No

61. ¿El tema de la alimentación saludable y la actividad física como lo propone el programa de acción en el contexto escolar se abordan dentro del currículo escolar?
   
   1) Si
   2) No (Pase pregunta 41)

62. ¿Dónde?
   
   1) Libros de texto
   2) Clase de educación física
   3) Carteles
   4) Periódico mural
   5) Otros: ____________________________

63. ¿Cómo?

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

**SERVICIOS DE ALIMENTOS Y AMBIENTE FISICO**

64. ¿Existe algún tipo de listado de alimentos y bebidas o de manual de operaciones que guíe la ejecución de la venta de alimentos y bebidas en la escuela?
   
   1) Si
   2) No (Pase pregunta 35)

65. ¿Quién lo provee?

   __________________________________________________________

66. ¿Considera qué la venta de la cooperativa en esta escuela cumple con las normas de venta de alimentos y bebidas propuestas por los lineamiento propuestos por la SEP y la SS?
   
   1) Si
   2) No
67. ¿En esta escuela se reparte el desayuno escolar?
   1) Sí
   2) No

68. ¿Cuánto tiempo tienen los alumnos para consumir lunch o refrigerio escolar?
   1) 30 minutos
   2) Más de 30 minutos
   3) Menos de 30 minutos

69. ¿En ésta escuela se restringe la propaganda de alimentos y bebidas industrializados que usted considere no saludables?
   1) Sí
   2) No
   3) Otra respuesta __________

70. Existe un mecanismo de supervisión la propaganda del consumo de alimentos y bebidas?
   1) Sí
   2) No
   3) Otra respuesta __________

71. ¿En las inmediaciones de ésta escuela hay propaganda de alimentos y bebidas industrializados que usted considere no saludables?
   1) Sí
   2) No

---

**PROMOCION DE LA SALUD PARA DOCENTES Y PERSONAL**

72. ¿Los maestros y docentes de esta escuela han recibido alguna educación sobre estilos de vida saludable en el último año?
   1) Sí
   2) No

73. ¿En ésta escuela se supervisa el peso y la talla de los estudiantes?
   1) Sí
   2) No

74. ¿Con qué frecuencia?
   1) Cada 6 meses
   2) Una vez al año
   3) Menos de una vez al año
   4) Otra: __________________________

75. ¿Quién es el encargado de tomar las mediciones?
   ________________________________________________________________

76. Se entrega el resultado de las mediciones a los tutores o padres de familia de los estudiantes?
   1) Sí
   2) No
77. Se recomienda algún tipo de servicio de salud ya sea de nutrición o de actividad física para los padres de familia que tengan un hijo con algún problema de peso?

1) Sí, Cual?__________________________

2) No (fin de la encuesta)