

Factors Associated with Childhood Obesity



Authors:

Dr. Richard Visser*, DC, PhD

Dr. Gregory Laclé**, MD

Dr. Troadio González***, MD, Ph D

Dr. Angel Caballero***, Ph D

*Visser Wellness and Research Center

** General Hospital of Aruba

***Institute for Nutrition and Food Hygiene

Keywords:

childhood obesity, associated factors.

Information about the principal author:

Director of the Visser Wellness and Research Center
Havenstraat #30, Oranjestad ,ARUBA .
Tel.(297) 583-0036 Fax.(297) 583-0031
e-mail: drvisser@simplyh.com

Abstract:

Childhood obesity has become an important problem on a global scale over the last few years. This report represents a study performed with the objective of identifying factors associated with poor nutrition due to excess caloric intake in Aruban school children ages six to eleven years. 1,776 school children were chosen for this study, 523 of whom were obese, 208 overweight and 1045 in the normal, healthy weight range, and whose parents, teachers, food handlers and merchants were surveyed with respect to nutrition, personal background and family members. In addition, surveys were performed concerning school conditions as

health

holistic

humanidad

healing

humanity

honestidad

heart

home

they related to childhood obesity. The results obtained coincide with those found by other authors: overweight and obese children have a history of lower-than-usual consumption of breast milk along with premature initiation into complementary nutrition, skipping breakfast, elevated consumption of foods rich in simple sugars and neutral fats at snack times and elevated consumption of high-energy foods during the late hours of the day, accompanied by low consumption of fruits and vegetables. Factors considered compatible with secondary or exogenous causes of obesity were found. It is concluded that the childhood obesity observed is a problem associated with lifestyle, and can thus be modified via health measures undertaken to correct it.

Introduction

Poor nutrition due to excess caloric intake constitutes an important health problem because of its effects on the adult population¹. It is becoming increasingly common in girls as well as in boys^{2,3} which is why it is necessary to study its causes in order to develop the necessary measures that will allow for its elimination and prevention.

This study was performed with the goal of identifying factors that may be related to childhood obesity in Aruban school children ages six to eleven years.

Methods

A study was performed with the aim of identifying factors that may be related to poor nutrition due to excess caloric intake among the study population. To carry out this study, 1776 school children were selected, among whom 523 were obese, 208 were overweight and 1045 were in the normal weight range. Information regarding other aspects associated with childhood obesity in relation to this study was obtained by surveying 2034 parents, 92 teachers, 52 food handlers and 28 merchants. The surveys were designed and carried out in relation to nutritional history and other factors associated with obesity.

Conditions at the schools that could facilitate poor nutrition through excess caloric intake were investigated, as well as the level of understanding and perceptions of childhood obesity among teachers, parents, food handlers and merchants who work at the schools or are involved with them.

Results

Table 1 presents data regarding breast feeding behavior, as well as data regarding school children who had been fed exclusively breast milk. Table 2 displays the results of the study in relation to nutritional habits such as eating breakfast, the antioxidant quality of the diet and the proportion of school children who consume most of their food at lunch and dinner time.

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

Conditions at the schools that may facilitate childhood obesity are presented in Table 3.

Opinions and knowledge of parents, teachers, food handlers and merchants regarding childhood obesity are displayed in Table 4.

Discussion

The parents of the 1776 school children who responded to survey regarding their children's breast feeding indicated that 961 (91.9%) of those in the healthy weight range had been breast fed, while 115 (55.2%) of those considered overweight and 368 (70.8%) of those who were considered obese had also been breast-fed.

181 (17.3%) of those in the ideal weight range received only breast milk for the first six months of life. 37 (17.7%) of those considered overweight had been so fed, and 53 (10.1%) of those considered obese received only breast milk during their first six months, according to the responses supplied by their parents. Table 1

Behavior regarding mixed nursing and the complementary nutrition of the school children studied corresponded with the data concerning breast-feeding and exclusive breast-feeding previously mentioned.

Breast feeding is a natural nutritional method for infants and its nutritional, immune and psychological advantages are well-known. Breast milk provides optimal nutrition for infants and its composition is ideal for optimal growth, development and maturation during the first six months of life.

Scientific literature indicates that feeding infants exclusively with breast milk during the first six months of life is a first step towards preventing obesity in subsequent stages of life, as children who are breast-fed are better able to control the quantity or volume of food they consume. Because satiation does not depend only upon the volume ingested, but rather also on the composition of the nutrients, the satiation mechanisms involved in nursing are associated, to a great extent, with the fats found in breast milk. Children fed with breast milk are more active, they work more, they are engaged more actively in their own nutrition, they are awake longer, they develop fine motor skills as well as visual acuity more quickly, and are able to distinguish between colors earlier than children who are not breast-fed^{4,5}.

The first year is the fastest period of growth and development in the life of a child and is the period during which a child is the least mature and most vulnerable. For this reason, it is important to provide them with nutrition that is appropriate, sufficient, varied and balanced. The nutrition of a child during the first year of life is based on human milk and is complemented with other nutrients (complementary

health

holistic

humanidad

healing

humanity

honestidad

heart

home

nutrients) with the two-fold purpose of satisfying the child's energy and nutritional needs and creating appropriate nutritional habits. It should be remembered that infants are especially susceptible and vulnerable to poor dietary choices and their consequences are more severe than for older children or adults. It is commonly accepted that many infirmities such as obesity, atheromatosis, and cancer, among other conditions, are related to nutritional habits, which is why it is important to form correct habits in children and their families in order to contribute to the prevention of such health problems. Above all, the introduction of new foods should come only after six months of age, thus guaranteeing adequate growth and development in children, as recommended by the OMS. After six months of age, the introduction of complementary nutrition which provides the macro- and micronutrients requisite for the energy needs of this age is recommended in order to provide the necessary amounts of proteins, fats, minerals such as iron, zinc, and selenium, among others, and vitamins such as Vitamin A. After the first six months, when children begin to teethe and to sit up on their own and are more active, introduction of solid and semi-solid nutrients to complement breast milk is ideal. Ingesting solid foods is a "trial and error" learning experience for the child and should be made as enjoyable an activity as possible for the infant, as it will allow the child to learn the flavor, smell, color and texture of different foods. For this process to be successful, it is necessary to select appropriate foods based on their nutritional value and to use proper sanitation in their preparation so as not to harm the child's health. Premature introduction of alternative foods could cause energy intake above recommended levels and the formation of undesirable eating habits such as an addiction to excess simple sugars, which can in turn bring about the creation of dietary habits that could lead to obesity. It also creates the risk of having a diet that is too high in animal and/or vegetable proteins and the appearance of allergic reactions, asthmatic respiratory conditions and skin lesions that appear at an early age. It can also cause food allergies or digestive intolerance to substances such as gluten⁴.

It is important to mention that non-human milk contains a higher concentration of proteins and energy density per volume unit than breast milk, as other species grow at a faster rate. Non-human milk possesses protein content and types, as well as caloric density, for that is inappropriate for human infants. The protein load in non-human milk and other protein-rich foods of animal origin, such as meat, result in a renal load that is too high and which can lead to hypernatremic dehydration in children, especially if they are ill with fever or diarrhea, which increase the loss of fluids through extrarenal processes. Therefore, foods other than breast milk should not be introduced before six months of age because of individual factors relating to maturation, growth and development of the child; due to characteristics of the foods themselves that do not meet the necessary requirements for this developmental stage; and because of the negative effects that can take place and which can, from an early age, create dietary behavior that can lead to obesity^{6,7,8}.

Of the 1,776 school children studied, 1678 (94.4%) had five meals or snacks each

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

day, while it was determined that 1,278 (71.9%) of them did not eat breakfasts. This poor nutritional habit was found in 618 (59%) of children in the healthy weight range, 169 (81.2%) overweight children and 491 (93.8%) of those children considered obese. Table 2

The poor habit of skipping breakfast was frequently found in communities where the parents' poor planning and allotment of time in the morning, lack of attention to the importance of eating breakfast and lack of information regarding correct nutritional habits led to breakfast not being prepared and no one in the family eating breakfast.

It should be pointed out that breakfast is the nutritional activity which takes place after several hours of nocturnal fasting and is the meal that prepares the body for its daily activities. A good day begins with a good breakfast, regardless of the individual's age.

During school years, breakfast is very important as it facilitates enhanced scholastic performance and contributes to the development of voluntary attention and the concentration required as part of the learning process. It also helps to achieve the number of required nutritional events during the day and helps individuals avoid consuming foods high in simple sugars during mid-morning.

Treatment and prevention of obesity requires nutritional intake to be broken up into small portions in the form of at least five meals or snacks per day. Of course, breakfast should be the first of these.

It should be mentioned that when an individual goes several hours without eating, the sense of hunger becomes intense and his or her need to eat becomes more marked, which influences his psycho-emotional state, eventually leading to cravings and making it more likely that the next meal will be excessive and not selective⁹.

It has been proposed that school children who do not eat breakfast are more likely to eat foods high in sugars that are frequently sold in or around the schools, in addition to eating excessive amounts during the next two meals or snacks.

These statements indicate that priority should be given to any measure that will facilitate the beneficial practice of eating a breakfast each day that does not contain high levels of simple or refined sugars, fried foods or other types of foods that do not contain the required nutrients (principally vitamins, minerals and trace elements) for correct and healthy nutrition required by school-aged girls and boys^{10,11}.

With respect to the size of the various meals and snacks eaten throughout the day, 1127 (63.4%) of the 1,776 school children studied consumed the greatest amount of food during lunch and dinner. This behavior was identified in 543

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

(51.9%) of the children in the healthy weight range, 106 (50.9%) of the children considered overweight and 478 (91.3%) of the children considered obese. Table 2

Each meal or snack must satisfy a certain percentage of the individual's total energy requirements (internal dietary energy balance). When this balance is broken, the use of metabolizable energy becomes less efficient, and when larger amounts of nutrients are consumed toward the end of the day or during the night hours, it is very likely that an elevated synthesis of neutral fats will take place and that these will accumulate in adipose tissue due to neuroendocrinal readjustments which target mainly the liver and adipose tissues. This promotes a surplus energy balance, and for this reason it should be mentioned that the behavior observed in the population studied helps to explain the prevalence of childhood obesity discovered^{12,13}.

With respect to foods high in phytochemicals and other antioxidants, such as fresh, dark green vegetables, fresh fruits, yellow fruits and vegetables and foods containing soy, it was observed that of the 1,776 school children studied, 1093 (61.5%) never ate such foods. The lack of such foods was observed in 436 (42.7%) of children in the healthy weight range, 176 (84.6%) of overweight children, and 481 (91.9%) of children considered obese. Table 2

The reutilization of neutral oils to fry food was common in all cases studied and was found to be an everyday practice, as well as the failure to cover the dishes or pots used to prepare such foods.

The low consumption levels of fresh dark green, yellow, and orange fruits and vegetables found in the study population reflect the poor antioxidant quality of their diet. Consumption of products that contain soy was also very low.

This behavior indicates that the total antioxidant capacity of the school children's systems could be diminished to such a level that they face the risk of developing a state of oxidative stress found in obese persons, with the resulting cellular damage produced by attacks by free radicals. In addition, the types of diets identified in the study are lacking in phytochemicals, which in turn possess a certain antioxidant capacity and strength. This situation increases the likelihood of oxygen-based reactions producing cytotoxic effects which are unquestionably related to practically every kind of ailment associated with obesity. Additionally, the types of diets identified are also lacking in specific antioxidants naturally found in the body such as Vitamins A, C, E and, to a greater or lesser extent, B complex and some trace elements such as copper, selenium, zinc and magnesium.

While the antioxidant levels in the identified diets were low, these diets were extremely rich in meats, milk and dairy products, saturated fats and simple or refined sugars, that is to say, in components of an acidotic diet that allows for the cytotoxic effects produced by free radicals to be even greater.

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

The result of this diet can increase the risk of phenomena primarily related to lipid oxidation in the liver and in any biological membrane in the cells of the various tissues and organs of the body, which is why in a situation such as the one described, no type of cell can be considered protected.

In addition to the high level of neutral saturated fat consumption, it was also noted that these fats were especially bad because meals frequently contained foods fried with oil that had been used several times, both at home and in communal eating establishments where the quality of the oil was not systematically and correctly monitored. Consumption of these reheated fats, with their increased viscosity and opacity, and which bubble when used, indicate a high grade of deterioration and are linked to conditions such as cancer and arteriosclerosis, among others, because of their high toxic substance content.

Information regarding the likes, preferences and consumption of foods among the children studied indicates that the elevated consumption of foods containing saturated fats of animal origin that are consumed in fried foods, simple or refined carbohydrates or in drinks sweetened with sucrose, as well as high levels of starch from refined pastas or pastries, are evidence of the poor dietary habits related to the development and maintenance of surplus energy balances which promote the development of excess weight and obesity. This is particularly significant when one takes into account that these dietary components are consumed in large quantities during the late hours of the day.

According to the surveys performed, there is not an elevated consumption of table salt among the school children studied.

The parents of 1422 (80%) of the school children could not remember their child's weight at birth. Among the 354 who did recall their child's weight, 102 (28%) were underweight at birth and 47 (13.2%) were macrosomic.

Even though these figures do not lend themselves to an analysis of the population under study, we can suggest that they contribute to high levels of prevalence of childhood obesity, as low birth weight has been proven to increase the risk of developing overweight and obesity issues during later stages in life. This situation has led to the development of the theory called the "hoarding phenotype", which indicates that low birth weight allows the body to initially develop a metabolic structure that allows bioavailable free energy to be used with high efficiency. This kind of metabolic structure remains imprinted in the so-called metabolic memory which remains in later stages of life, resulting in a more efficient use of free energy, a factor in the likelihood of developing synthesis and excess accumulations of neutral fats in the adipose tissue. Regarding the birth of macrosomic fetuses and obesity, it has been suggested that there is a greater capacity to utilize glucose for energy production, and as long as sufficient glucose is available, to achieve higher concentrations of metabolites such as acetyl coenzyme A, which are known to intervene in the synthesis of fatty acids and neutral oils, both in the

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

liver as well as in adipose tissue. It has also been proposed that, in conjunction with the development of macrosomia, the development of a subsystem of the endocrine system plays a role. This subsystem regulates and modifies the metabolic effects that can result in obesity.

In relation to the factors associated with obesity in girls and boys, precursors to obesity before six years of age were found in 22 (4.2%) cases during infancy and in 62 (11.8%) cases during the pre-school years, which indicates an increased probability of the emergence of obesity during the school years and adds a component of adipose hyperplasia that renders it more difficult to treat.

The possible secondary pathological conditions for the obesity identified were most often sleep apnea, constipation and hemorrhoids. The latter two were found in conjunction with poor eating habits in the obese, due to lack of dietary fiber in their diets.

Pathological conditions such as mental retardation, encephalopathies, genetic disorders or hypothyroidism suggesting the possible existence of primary obesity were not found. In addition, other pathological conditions that suggest habitual use of medications that cause obesity (corticoids) such as nephropathies, renal deficiency, cardiopathies and bronchial asthma, were not identified. Pathological conditions that constitute a diagnosis other than obesity, such as edemas and myxedemas, were not reported.

These results suggest the likelihood that the type of obesity detected in the school children studied is predominantly exogenous or secondary in nature.

Bulimia and anorexia, as reflections of obesity-related psycho-emotional disorders, were not found in the school children studied.

In regards to the scholastic achievement of the 1,776 girls and boys studied, it was found that of the 523 children considered obese, 329 (62.9%) exhibited similar difficulties marked by a tendency to fall asleep in class, which could be explained by sleep disorders and a diminished pulmonary ventilatory capacity among the obese, as well as by the previously noted tendency to skip breakfast. Difficulties in scholastic achievement were found in 43 (20%) of those children who were considered overweight and in 12 (1.1%) of those children falling in the healthy weight range.

Habitual use of medications was not determined in any of the cases.

Educational level attained, for levels between average and high average, as well as the age and occupational categories of the parents, were found to have no relationship to the children's weight category (ideal weight, overweight and obese).

It is important to note that the parents of the school children studied belong to occupational categories that do not include intense or moderate physical activity, as well as food service jobs which could have an indirect impact on the sedentary

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

lifestyles among the school children as well as a tendency towards overeating.

With respect to the parents of the students studied, health conditions such as obesity, high blood pressure, cardiopathies and high cholesterol were detected and were more frequent among the parents of obese children, which support the notion that such conditions are a factor in childhood obesity^{14,15,16,17,18,19,20}.

The previously mentioned characteristics of the boys and girls, as well as those of their parents, and which are associated with childhood obesity, are representative of the environmental conditions on the Island which tend to promote a high prevalence of this disease among the children studied.

Conditions that promote obesity were surveyed in the 15 school populations of 1,776 girls and boys studied in September of 2004. This allowed for the collection of information regarding the lack of areas designated for sports, games or dances in seven of the schools. None of the schools had developed curricular or extracurricular physical education activities.

In these institutions, school children attend classes without eating breakfast and are transported from home in vehicles. In and around the schools, foods high in simple sugars or neutral fats are provided, while fruits and vegetables are not available. Activities that promote healthy eating have not been carried out with these children. Table 3

In order to avoid childhood obesity, the conditions that contribute to it must not be present in schools or in the community. As a result, it has been recognized that, as part of the action required to combat this disease, a great variety of measures must be adopted in order to develop healthy nutrition among school children and in order for these boys and girls to be able to participate in sports, dances, walks or other activities that will make it possible for them to achieve a metabolic output that matches their food intake²¹.

The surveys of parents and teachers, as well as those of food handlers and merchants in relation to the school children studied, provided information regarding their understanding and perceptions of the risks related to childhood obesity. These surveys determined that only 47.6% recognize the existence of obesity among Aruban girls and boys, while 82.1% of respondents do not recognize that obesity affects health. More than 75% of those surveyed did not answer correctly regarding the importance of breakfast or of eating fruits and vegetables, nor did they mention the value of athletic activity for proper health among school children. None of those interviewed recalled having ever heard or seen educational messages in the Aruban mass media regarding obesity. Those who were able to answer questions about obesity with the greatest accuracy were the teachers. Table 4

Recognizing the presence and characteristics of a disease that constitutes a public health problem in a population is an essential pre-condition for organizing and

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

carrying out activities that will contribute to its reduction and eradication^{15,22}. Thus, the answers given by those surveyed indicate not only a low level of understanding and perception of the risks associated with childhood obesity, but also point out the need to instruct the public and to develop intense and efficient health education in order to avoid the adverse effects of overweight and childhood obesity on the Island.

Conclusion

Childhood obesity in the population studied appears to be associated with insufficient breast feeding, premature introduction of complementary nutrition, skipping breakfast, and excessive caloric intake in meals taken later in the day and at night, as well as insufficient consumption of fruits and vegetables.

Conditions which promote childhood obesity exist in the schools in the form of sales of foods high in simple sugars and a lack of opportunity to participate in moderate to intense physical activity.

There is a lack of critical understanding concerning childhood obesity and its risks among the parents, teachers, food handlers and merchants studied.

Bibliography

1. James PT. Obesity: the worldwide epidemic. *Clin Dermatol.* 2004;22(4):276-80.
2. Seidell JC. Epidemiology of obesity. *Semin Vasc Med.* 2005;5(1):3-14.
3. Abbott RA, Davies PS. Habitual physical activity and physical activity intensity: their relation to body composition in 5.0-10.5-y-old children. *Eur J Clin Nutr.* 2004;58(2):285-91.
4. Dei-Cas, P. Overweight and obesity in 2 to 9 year-old children: relationship with influencing factors. *Arch Argent Pediatr* 2002;100(5):368-373
5. Díaz-Argüelles RCV, Pupo PL, González MA. Desbalance energético proteico en lactantes. *Rev Cubana Pediatr* 2004;2:18-23.
6. Monteiro PO, Victora CG. Rapid growth in infancy and childhood and obesity in later life - a systematic review. *Obes Rev.* 2005;6(2):143-54.
7. Knip M, Akerblom HK. Early nutrition and later diabetes risk. *Adv Exp Med Biol.* 2005;569:142-50.
8. Koletzko B, Broekaert I, Demmelmair H, Franke J, Hannibal I, Oberle D, Schiess

s i m p l y 

health

holistic

humanidad

healing

humanity

honestidad

heart

home

S, Baumann BT, Verwied-Jorky S; EU Childhood Obesity Project. Protein intake in the first year of life: a risk factor for later obesity? The E.U. childhood obesity project. *Adv Exp Med Biol.* 2005;569:69-79.

s i m p l y 

9. [Louis-Sylvestre J](#), [Lluch A](#), [Neant F](#), [Blundell JE](#). Highlighting the positive impact of increasing feeding frequency on metabolism and weight management. *Forum Nutr.* 2003;56:126-8.

10. Elgar FJ, Roberts C, Moore L, Tudor-Smith C. Sedentary behaviour, physical activity and weight problems in adolescents in Wales. *Public Health.* 2005;119(6):518-24.

health

11. Lawlor DA, Smith GD. Early life determinants of adult blood pressure. *Curr Opin Nephrol Hypertens.* 2005;14(3):259-64.

holistic

12. Lamerz A, Kuepper-Nybelen J, Bruning N, Wehle C, Trost-Brinkhues G, Brenner H, Hebebrand J, Herpertz-Dahlmann B. Prevalence of obesity, binge eating, and night eating in a cross-sectional field survey of 6-year-old children and their parents in a German urban population. *J Child Psychol Psychiatry.* 2005;46(4):385-93.

humanidad

13. Butryn ML, Wadden TA. Treatment of overweight in children and adolescents: Does dieting increase the risk of eating disorders? *Int J Eat Disord.* 2005;37(4):285-293

14. Bener A, Zirie M, Al-Rikabi A. Genetics, obesity, and environmental risk factors associated with type 2 diabetes. *Croat Med J.* 2005; 46(2):302-7.

healing

15. Huang TT, McCrory MA. Dairy intake, obesity, and metabolic health in children and adolescents: knowledge and gaps. *Nutr Rev.* 2005;63(3):71-80.

humanity

16. [Ford ES](#). The epidemiology of obesity and asthma. *J Allergy Clin Immunol.* 2005;115(5):897-909

17. Meyre D, Boutin P, Tounian A, Deweirder M, Aout M, Jouret B, Heude B, Weill J, Tauber M, Tounian P, Froguel P. Is glutamate decarboxylase 2 (GAD2) a genetic link between low birth weight and subsequent development of obesity in children? *J Clin Endocrinol Metab.* 2005;90(4):2384-90.

honestidad

18. Lipton RB, Drum M, Burnet D, Rich B, Cooper A, Baumann E, Hagopian W. Obesity at the onset of diabetes in an ethnically diverse population of children: what does it mean for epidemiologists and clinicians? *Pediatrics.* 2005;115(5):e553-60.

heart

19. Baker S, Barlow S, Cochran W, Fuchs G, Klish W, Krebs N, Strauss R, Tershakovec A, Udall J. Overweight children and adolescents: a clinical report of the north american society for pediatric gastroenterology, hepatology and nutrition. *J*

home



20. McKnight-Menci H, Sababu S, Kelly SD. The care of children and adolescents with type 2 diabetes. J Pediatr Nurs. 2005;20(2):96-106.

21. Organización Mundial de la Salud. Estrategia mundial sobre régimen alimentario, actividad física y salud. 57 Asamblea Mundial de la Salud. Ginebra:OMS;2004: (WHA57.17)

22. Bruss MB, Morris JR, Dannison LL, Orbe MP, Quitugua JA, Palacios RT. Food, culture, and family: exploring the coordinated management of meaning regarding childhood obesity. Health Commun. 2005;18(2):155-75.

Table 1. Breast feeding behavior and exclusive breast feeding among school children studied

Anthropometric nutritional classification	School Children Studied	Breast-fed	Exclusively breast-fed
Healthy weight	1045	961 (91.9%)	181 (17.3%)
Overweight	208	115 (55.2%)	37 (17.7%)
Obese	523	368 (70.3%)	53 (10.1%)
Total	1776	1444 (81.3%)	271 (15.4%)

health

holistic

humanidad

healing

Table 2. Behavioral habits regarding nutrition among school children studied

Anthropometric nutritional classification	School Children Studied	School children who did not eat breakfast	School children who consumed large portions during lunch and dinner	School children whose diets were low in antioxidants
Healthy weight	1045	618 (59%)	543 (51.9%)	436 (42.7%)
Overweight	208	169 (81.2%)	106 (50.9%)	176 (84.6%)
Obese	523	491 (93.8%)	478 (91.3%)	481 (91.9%)
Total	1776	1278 (71.9 %)	1127 (63.4 %)	1093 (61.5%)

humanity

honestidad

heart

home

Table 3. Conditions in schools that could affect childhood obesity.

	September 2004	July 2005
1. Areas available for participating in: sports, dancing, games	8 yes	12
2. Physical education classes are a systematic part of the school curriculum.	15 no	8
3. Amount of time dedicated each week to physical education for each grade	None	90 minutes in eight schools
4. Extracurricular physical activities are carried out:	15 no	5
5. Time dedicated each week to extracurricular physical activity:	15 none	60 minutes in eight schools
6. Boys and girls eat breakfast	15 no	11
7. Sugary drinks, confections and fried foods are sold close to or at the school	15 yes	12 yes
8. Fruit, natural fruit juice, milk or yogurt is sold at or close to the school	15 no	12 yes
9. Boys and girls walk to and from school		
10. The school has carried out activities to promote healthy nutrition	15 no	15 no
	15 no	5 yes

health

holistic

humanidad

healing

humanity

honestidad

heart

home

Table 4. Opinions and understanding regarding childhood obesity. September 2004

Questions	Number and category of persons surveyed				Total
	92 Teachers	2034 Parents	52 Food handlers	28 Merchants	
	Yes (%)	Yes (%)	Yes (%)	Yes (%)	
1. Is obesity common among girls and boys in Aruba?	61 (66,3)	976 (47,9)	11 (21,1)	4 (14,2)	1052 (47,6)
2. Does childhood obesity affect health?	65 (70,6)	318 (15,6)	9 (17,3)	4 (14,2)	396 (17,9)
3. Is it important for children to eat breakfast?	62 (67,3)	422 (20,7)	11 (21,1)	5 (17,8)	500 (22,6)
4. Should a person regularly eat fruits and vegetables?	61 (66,3)	379 (18,6)	15 (28,8)	6 (21,4)	461 (20,8)
5. Should a person avoid drinking sugary drinks, fried foods and confections?	61 (66,3)	309 (15,1)	8 (15,3)	4 (14,2)	382 (17,3)
6. Is it good for boys or girls to dedicate a lot of time to watching television or to playing with computers?	82 (89,1)	1721 (84,6)	43 (82,6)	25 (89,2)	1871 (84,8)
7. Is it healthy for boys and girls to participate in sports?	65 (70,6)	562 (27,6)	15 (28,8)	8 (28,5)	650 (29,4)
8. Do you recall an educational message on obesity?	(0)	(0)	(0)	(0)	(0)
9. Did any of those messages cause you to change your opinion?	(0)	(0)	(0)	(0)	(0)
10. Did any of those messages cause a change in the way you deal with boys and girls?	(0)	(0)	(0)	(0)	(0)
Total					2206

health

holistic

humanidad

healing

humanity

honestidad

heart

home