

APPENDIX 2. Semantic Considerations, Sample Design, Expert Criteria, Field Work, Statistical Analysis.

Semantic Considerations

Central Obesity

This type of obesity is characterized by an accumulation of both visceral and subcutaneous body fat in the trunk and abdominal regions, resulting in a tricipital/subscapular skinfold ratio (TST/SST I) less than 1 and a Waist to Hip Circumference Index (WC/HC I) close to or greater than 1. This type of obesity is also known as android or “pear-shaped” obesity.

Primary Obesity

Primary obesity is defined as obesity caused principally by environmental or external factors such as diet and physical activity, among others. These factors, when combined with genetic factors, produce a metabolic imbalance between energy intake and energy expenditure in favor of the former, which results in the accumulation of that energy in the form of adipose tissue. This type of obesity is also known as exogenous obesity.

Secondary Obesity

Secondary obesity is characterized by an accumulation of excess fat due largely to factors inherent to an individual; in other words, secondary to genetic factors or neuroendocrine problems, which means that the individual suffers from a genetic or neuroendocrine illness or disorder. This type of obesity is also known as endogenous obesity.

Sample Design

The universe consisted of 9,604 school children ages 6 – 11 attending 38 schools in Aruba. Of these, a sample of 3,952 school children was selected.

In this case, previous studies done in the country had shown that the prevalence of malnourishment due to excess energy intake was about 15%. In addition, an E_o of 2.0 and a confidence level of 95% were used.

A design effect of 1.2% was accounted for and sample attrition was estimated to be approximately 3%.

The sample design was chosen to yield a self-weighted sample of all 6 to 11 year-old children in the country. A Two-Stage Cluster Sampling technique was used. The algorithm is described below:

1. Selection of First Stage Units:

Elementary schools were selected with a probability proportional to the number of children attending, resulting in the selection of 15 schools.

2. Selection of Units for Analysis:

Systematic sampling methods were used to select 264 students from each school and all students from schools with less than that number attending.

Ratio estimators using the total number of 6 to 11 year-old children in the country as an auxiliary variable were applied, and point and interval estimates were made.

Expert Criteria:

For selection of school children for biochemical and mechanical energy expenditure analysis research:

School children ages 6 to 11 willing to participate in the research project with the authorization of their parents and teachers. The anthropometric nutritional classification, age, and sex of the children selected allowed the formation of groups for later classification.

For selection of school children to participate in childhood obesity-related factors research:

Selection of the sample used to study factors related to the onset of obesity was based on the following criteria: One of every two obese children, one of every two overweight children, and two control subjects were selected randomly from each group of school children. Based on these criteria, 523 obese children, 209 overweight children, and 1,046 healthy children were selected, for a total of 1,778 individuals. During the field study, it was discovered that data from one overweight child and one healthy child could not be used; therefore, the number of children participating in the research was as follows: 523 obese children, 208 overweight children, and 1,045 healthy children, for a total of 1,776 children.

For the pilot study:

A pilot study was performed at a school using the instruments used for this study, which allowed us to determine acceptance, gain a better understanding of the terms used, and obtain other information, and allowed us to identify items that needed to be modified in the final version of the research procedures and instruments.

Field Study

Introduction

The research project and the field work together with the corresponding activities were explained to education, health, parent association, bioethics experts, and government authorities, who approved the execution of the project and also accepted it as compliant with the principles of medical ethics.

This work was performed under the express authorization of parents, teachers, students, school boards, and Education Department authorities.

In order to facilitate research activities, physical exams and laboratory tests were coordinated the day before the anthropometric evaluations. This coordination was done in collaboration with school superintendents and teachers. The children were also notified beforehand.

Research assistants (work team) were trained in the activities they would be performing during the field study.

This training effectively increased their ability to perform their duties with regard to anthropometric evaluations; surveys; teacher, parent, school child, food handler, and vendor training; physical activity development; breakfast promotion activities; healthy diet promotion activities; and public dialogue, as well as the establishment and operation of “Comunidad con Vitalidad” (hereinafter “Vitality in the Community”, ALLIANCE AGAINST OBESITY).

In-Field School Research Procedures

1. Schools received the visitation schedule in advance and were asked to provide the following items on the day they were visited:

A well-lit, ventilated area;

Two cooperative female educators, who would be responsible for organizing the children for the measuring and examination process;

A list of school children by grade, classroom, and sex, including the following information:

- name
- date of birth
- home address

All this information was recorded in the Questionnaire 1 model.

A small table and chair for taking Blood Pressure;

A table and chair to facilitate the use of the research team’s laptop computer;

A table or gurney for the children to lie down on during the physical exam;

A sink, soap, and paper towels.

2. On the day measurements were to be taken, the research team arrived at the school at 7:00 a.m. with all instruments needed.
3. From 7:00 a.m. to 8:00 a.m., time was spent building rapport with school staff and setting up instruments in the designated area. The first three groups to be measured and examined were organized during the same hour.
4. Measurement activities began at 8:00 a.m. and lasted until 1:00 p.m., with a 15 min. break at 10:00 a.m.
5. Once the measurement and examination process had begun, participating professors began to organize the remaining groups of students. One of the research team facilitators also helped with this process. The process began with the youngest groups in the school.
6. 15 min. before 8:00 a.m., the first group to be measured was shown into the area (where space allowed) or into a nearby area to remove clothing, shoes, and socks. They left their undergarments on. Girls were required to undo buns, ponytails, and hairstyles using clips, elastic, and other accessories. All were instructed to empty their bladders before entering the measuring area.
7. While the first group was being measured and examined, the second group began to remove clothing and hairstyles. The following groups proceeded in a like manner.
8. Puberty-age girls and boys (from 10 to 11 years) separated by sex before entering the designated area for removing clothing, measurements, and examinations.
9. All measurements were made before lunch (students had only eaten breakfast in the morning). When finished, they were allowed to eat lunch or a snack.

The research team and the measurement and physical examination processes were organized as follows:

Two teams previously trained by the head researcher.

Each in-field research team consisted of 5 individuals:

The facilitator: made Blood Pressure measurements

The recorder: entered measurement results into a laptop computer

Measurer A: worked with the scale, stadiometer, and measuring tape

Measurer B: worked with measuring tape, dermatographic pencil, and caliper.

The examiner: coordinated the activity, and was provided with a table for performing physical examinations, tongue depressors, a stethoscope, and a digital camera.

Activities Performed:

The facilitator managed the line of children, took their Blood Pressure and told them when to step onto the scale or balance.

The recorder operated the laptop computer, entering the results recorded by the measurers and data from the examiner as such information was received and taking all precautions necessary to prevent loss of information or errors from the readings recorded.

Measurer **A** weighed each child on the scale.

Measurer **A** measured the height of each child using the stadiometer, as indicated.

Measurer **A** measured waist and hip circumferences.

Measurer **B** measured arm circumference.

Measurer **B** took skinfold measurements (TST, SST).

The examiner observed the child standing and explored for signs of:

Spinal deformation: scoliosis, lordosis, or kyphosis;

Lower extremity deformities: genu varus and genu valgus, among others;

Foot deformities: flat feet and others.

Oral and tooth examination using a tongue depressor.

The examiner recorded findings of interest in the corresponding forms.

The examiner placed each child supine and explored for signs of:

Skin lesions

Stages of breast development

Stage of pubic hair development

Stage of genital development

Secondary sex characteristics: facial and underarm hair

The examiner recorded all findings of interest.

The examiner took photographs of cases of special interest.

The measuring and physical examination process lasted approximately 3 minutes per child. 20 children were examined per hour—approximately 80 – 85 children per day, per research team.

Once the information for each child had been recorded, the assistant who entered the data onto the computer's hard drive made sure the data had been saved and copied it onto a removable storage device. All data was resaved after completing each group or grade. Once the process had been completed at the school, all data was saved onto at least three properly identified, removable storage devices.

Data was analyzed on the same day it was collected in order to identify obese, overweight, healthy, and undernourished individuals.

Children who would be surveyed and subjected to biochemical analysis the following day were selected, based on the diagnostics and the statistical sampling design.

Anthropometric measurement and physical examination information gathered was submitted to the head researcher, once work had been completed for each school.

Resources and Materials Used:

Two SECA brand scales,
Two stadiometers,
Four metric fiberglass tape measures,
Two calipers,
20 dermatographic pencils,
Four digital Blood Pressure monitors for greater accuracy and faster processing
(two large cuff and two small cuff monitors)
A laptop computer and five rewritable storage devices,
Disposable sheets or paper for laying children down during physical
examination.
A digital camera for photographs.

Statistical Processing of Primary Anthropometric Information and Physical Examination

Once anthropometric measurements and physical examinations had been completed for all children included in the representative sample, the data collected were subjected to statistical analysis.

Survey of Physical Conditions and Human Resources in Schools

On the same day as the anthropometric evaluation visit for each school, the evaluation team answered questions about existing conditions that could favor childhood obesity.

Parent Survey Procedures

6 survey takers who performed 10 surveys per day, in the morning and in the evening, reported the results of 60 surveys per day, or 360 per week.

The members of the research team surveyed parents in accordance with instructions received during training and the corresponding instruction sheets.

Information gathered during these surveys was given to the Head Researcher once work with the parents had been completed for each school.

Statistical Processing of Survey Results

Once the data indicated in the questionnaires had been collected, the corresponding statistical analyses were performed.

Blood Extraction Equipment and Sensor Placement

Three professional nurses were employed to perform blood extraction and four individuals trained in the use of CT1 mechanical energy expenditure sensors were also employed.

The sensors were placed at 8 AM every morning to measure mechanical energy expenditure for 7 days—the 24 hours following sensor placement were considered a day of evaluation.

Teacher, Parent, Child, Food Handler, and Vendor Training

The teachers were trained by the research team (3 instructors) and, with the cooperation of the teachers and under the supervision or council of the research team, the training was extended to the remaining Intervention Program targets.

The basic material used in the training is indicated in the Intervention Program.

Evaluation Indicators

Data required by the Intervention Program evaluation indicators will be collected by the research team.

Anthropometric Technique

Work was carried out in schools, by research teams consisting of trained individuals using scales, stadiometers, fiberglass metric measuring tapes, and calipers.

A form or template was created for the team (measurer and recorder) to present the results obtained.

Weight; height; tricipital and subscapular skinfold thicknesses; and arm, waist, and hip circumferences were measured. Weight/Height, Weight/Age, Height/Age, Waist/Hip Ratios, Body Mass Index, Areas of Fat and Muscle in the Arm, and TST/SST Indices were calculated. The results of these measurements—except for waist/hip ratios, which were compared with Cuban tables, as no WHO references have been developed—were compared with reference percentiles published by the WHO for classification.

The following equations were used to calculate these indices:

$$AA = AC^2/4\pi \text{ in cm}^2$$

$$FA = AA-MA \text{ in cm}^2$$

$$MA = (AC - TST \cdot \pi)^2 / 4 \pi \text{ in cm}^2$$

$$TST \text{ in mm}$$

$$AC \text{ in cm}$$

$$SIST \text{ in mm}$$

$$SST \text{ in mm}$$

Body fat can be determined in several ways:

- **BMI**
- Skinfold Thickness
- **WC/HC I**
- **AC**
- **TST/SST I**

With regard to Body Mass Index, the following concepts and definitions were used for the purposes of this study:

Body Mass Index (BMI) was calculated by dividing weight (W) in kilograms by height (H) in meters, squared:

$$\text{BMI} = \frac{W}{H (m)^2}$$

The BMI/Age percentile was calculated.

The tricipital skinfold thickness (**TST**) provides an estimate of peripheral body fat or limb fat, whereas the subscapular skinfold thickness (**SST**) provides a measurement of trunk fat. The TST/SST ratio was calculated in order to determine body fat distribution and classify obesity as central or peripheral.

The ratio between waist circumference and hip circumference (WC/HC I) was calculated for comparison with Cuban WC/HC I percentile tables for children of similar ages—international reference tables were not available for this particular ratio.

Arm circumference (**AC**) was measured at mid-arm (halfway between the acromion and olecranon landmarks), which would later be used to estimate the fat area (**FA**) to arm area (**AA**) ratio.

Muscle area (MA) provides an estimate of the body's protein reserves, while fat area offers an estimate of energy reserves in the form of fat. Muscle area is considered very high when measured values fall outside the 95th percentile; fat area is considered very high when measured values fall outside the 90th percentile.

The fat area offers the additional advantage that the standard for properly nourished children varies only slightly between the ages of 1 to 7, providing an age-independent evaluation of energy or fat reserves.

Measurement Method Used

Measurements were made using the technique described in Weiner and Lourie's International Biological Program: Subjects to be measured wore only undergarments and removed their shoes and socks as well.

At the beginning of our anthropometric work, the side of the body to be used for measurements made on only one side was chosen in accordance with International Biological Program standards, which specify the left side. This standard was maintained throughout the course of the study.

Anthropometric reference points were located and marked during the course of our anthropometric work.

All measurements were made with the subject in anthropometric position ("standing erect" or "at attention") with heels together and feet pointing outward at an angle of about 45°, arms hanging at the sides, and head placed in the Frankfort plane position.

The Frankfort plane was determined by means of an imaginary line connecting the left infraorbital rim with the upper edge of the external auditory canal. This plane remains parallel to the surface on which the subject is standing when standing erect.

Circumferences were measured using a metric measuring tape resting lightly on the skin; that is, the tape was not tightened enough to cause indentation, but was not left so loose that it became separated from the body.

Skin was required to be free of perspiration, as perspiration can increase friction between the skin and the measuring tape, causing the skin to be compressed during inhalation and preventing the tape from adjusting to the smaller circumference during exhalation.

The following procedures were used to measure circumferences and skinfolds:

- ***Waist Circumference (WC)***

The subject stood erect with the abdomen relaxed. The tape was placed at the back of the subject, along the natural waistline or the narrowest part of the torso. Measurement was made by extending the tape around the entire region, taking care to ensure that the tape remained horizontal (Lohman, Roche, and Martorell, 1988).

- ***Hip Circumference (HC)***

Hip circumference was measured by placing the subject in erect, but relaxed position with the knees together. The anthropometrist worked from the side of the subject, placing the tape around the subject's body, horizontally over the maximum extension of the buttocks (Lohman, Roche, and Martorell, 1988).

- ***Arm Circumference (AC)***

This circumference was measured from the middle of the arm, between the acromion and olecranon landmarks. With the forearm flexed to 90 degrees, the halfway point between the acromion process and the olecranon process was located using the measuring tape and marked (Jelliffe, 1966). Measurement was made with the subject's arms relaxed and at the sides of the body; the tape was placed around the arm over the reference mark, perpendicular to the axis of the arm.

- ***Subscapular Skinfold Thickness (SST)***

This skinfold was measured at the inferior angle of the scapula. The subject stood erect with shoulders relaxed and arms at the sides of the body. Skinfolts were measured vertically and at a slight angle (an angle of 45 degrees from the horizontal). The skinfold was oriented downwards and to the side, following the natural cleavage of the skin.

- ***Triceps Skinfold Thickness (TST)***

This skinfold was measured along the middle axis of the arm, at the middle arm mark, with the individual standing erect, with arms relaxed. A vertical skinfold was grasped, one cm above the reference point. The measurement point must be in the center of the arm, on the posterior surface, with the palm of the hand facing back (Lohman, Roche, and Martorell, 1988).

The values measured were compared with values published in FAO/WHO reference tables.

Because biological maturity can influence body measurements, it is necessary to obtain maturity-related information in order to correctly interpret the anthropological measurements and produce a proper nutritional evaluation. The physical examination allowed biological maturity to be determined.

It was necessary to determine whether the adolescent growth spurt had begun and also if the peak growth velocity had already passed, both indicators of a maturation level characteristic of exogenous or primary obesity.

For girls, the presence of stage 2 breast development (B-2) is an indicator that the adolescent growth spurt has begun. The beginning of breast development precedes the peak height velocity by about one year. Menarche occurs just over one year after peak growth velocity. It may be used as an indicator that most of the adolescent growth spurt has been completed.

For boys, stage 3 genital development (G-3) precedes peak height velocity by approximately one year and adult voice (AV) development occurs about one year later.

Average age estimates for the maturation indicators mentioned above have been published by the WHO for its anthropometric reference population, and are as follows:

Boys		Girls	
G-3	12.4 years	B-2	10.6 years
Peak Height Velocity	13.5 years	Peak Height Velocity	11.7 years
Adult Voice	14.5 years	Menarche	12.8 years

The results of this comparison will be used as indicators of nutritional state, in accordance with established maturity stages. This will help us to determine the nutritional state of the population studied from an anthropometric point of view, which is the proposed objective of this study. It is important to note that the population under study has a maximum age of 11 years, and therefore must not exhibit these levels of maturation except for stage 2 breast development in 10.6 year-old girls.

The results of all measurements and ratios were globally evaluated in order to determine the nutritional state of each individual studied. These individuals were then classified as obese, overweight, healthy or normal weight, and malnourished.

The results of the anthropometric evaluations were statistically analyzed in order to determine the corresponding proportions and tendencies.

Statistical Analysis

An initial univariate analysis was performed in order to evaluate possible risk factors. The chi square test of homogeneity was used to determine whether significant differences existed between the variables for obese and overweight individuals; where significant differences were found, the variables concerned were selected for multivariate analysis.

Once the variables selected in the univariate analysis had been determined, Phi correlation coefficients, Cramer's V (depending on whether tables had 1 degree of freedom or more than 1 degree of freedom), and Pearson's linear correlation coefficient for quantitative variables were used to determine the association between the variables to avoid the introduction of deficiencies in the multiple logistic regression parameter estimates due to excessive correlation between variables used in the model (possible risk factors identified using univariate analysis). Coefficient values greater than 0.8 were considered to represent

significant correlation and in these cases, one of the correlated variables was selected for analysis.

A multivariate analysis consisting of multiple logistic regression with dichotomous outcome was performed, based on the possible risk factors yielded by the univariate analysis. In addition to identifying factors, this analysis also provided control of confounding variables, and allowed the odds ratio and related confidence intervals to be estimated.

The Wald test was used to determine which variables had coefficients significantly different from 0 ($p < 0.05$). The ODDS RATIO (OR) was also estimated for each variable selected.

The goodness of fit of the model to the data was determined using the Chi Square Hosmer and Lemeshow statistic. The model was considered to fit the data when $p > 0.05$.

Paired sample proportion comparison tests were used to identify potential significant differences between initial and final results (after application of the Intervention Program).

Questionnaire 1 – Anthropometric Evaluation (First)

Name _____ dec. age _____ code _____
Sex _____ grade _____ school _____ Date of Birth: _____

Weight = _____ Kg	P/T= _____ percentil
Height = _____ cm	P/E= _____ percentil
	T/E= _____ percentil

BMI = $W / H(\text{in m})^2 = \text{___ kg/m}^2$	BMI/Age = _____ percentile
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$TST = \underline{\hspace{2cm}} \text{ mm}$

$SST = \underline{\hspace{2cm}} \text{ mm}$

$TST/SST = \underline{\hspace{2cm}}$

$WC = \underline{\hspace{2cm}} \text{ cm}$

$WC/HC I = \underline{\hspace{2cm}}$

$HC = \underline{\hspace{2cm}} \text{ cm}$

Waist / Hip Index = $\underline{\hspace{2cm}}$ percentile

$AC = \underline{\hspace{2cm}} \text{ cm}$
= $\underline{\hspace{2cm}}$ percentile

AC/Age

Fat Area = $AA - MA = \underline{\hspace{2cm}} \text{ cm}^2$

$FA/Age = \underline{\hspace{2cm}}$ percentile

Muscle Area = $(AC - TST \cdot \pi)^2 / 4 \pi = \underline{\hspace{2cm}} \text{ cm}^2$ $MA/Age = \underline{\hspace{2cm}}$ percentile

$AA = AC^2 / 4\pi = \underline{\hspace{2cm}} \text{ cm}^2$

Classification $\underline{\hspace{5cm}}$

Instructions for Questionnaire 1 – Anthropometric Evaluation

Work Team: Measurer and Recorder

Measurements to Be Made: Weight and Height

Measurement Method:

Requirements:

- Privacy
- Quiet environment
- Proper illumination
- Instruments in good condition and checked (calibrated, free of dust, readable)
- Measurements must be made during the morning (during the day, height decreases due to water loss in intervertebral cartilage)

- The measurer must not be given an expected range.

Weight

- Use a SECA balance beam scale
- The individual must be dressed only in undergarments, without shoes or socks
- The individual must not be wearing casts or orthopedic devices
- Measurement must be made in Kg and grams

Height

- Use the height rod incorporated into the SECA scale.
- Stretch stature
- With the subject standing erect (at attention or in anthropometric position): with feet pointing outward at an angle of 45 degrees with arms relaxed at the sides of the body, palms facing inward
- Place the head in Frankfort plane position, which extends from the infraorbital rim (measuring from the left) to the upper margin of the left auditory canal
- The subject must be barefoot
- Touching the backboard, which must be vertical and flat, with no irregularities (if a wall is used, it must not have a baseboard)
- Measure from the floor to the crown of the subject's head
- Ask the subject to take a deep breath
- The measurement must be made in centimeters or meters

Circumferences:

- Use metric fiberglass measuring tape
- Use pencil

Skinfolds

- Use digital caliper

Questionnaire 2 – Physical Examination:

Name _____ age _____ code _____
 Sex _____ grade _____ school _____

1,a BP _____
 Bl _____ **Br** _____

1,b Skin Color: **Wh** _____

2. Signs of Puberty

Tanner Stages	Girls		Boys	
	Breasts	Pubic Hair	Genitals	Pubic Hair
I				
II				
III				
IV				
V				
VI				
Secondary Sex Characteristics Yes___ No___	1. Underarm Hair:_____		1. Voice Change:_____	
	2. Hip Width:_____		2. Facial Hair:_____	
	3. Fat Tissue on Buttocks and Hips:_____		3. Body Hair:_____	
			4. Shoulder Width:_____	
Menarche	1. Yes___ 2. No:_____			
	Virilization Yes___ No___		Feminization Yes___ No___	

3. Dysmorphic Signs or Other Malformations Detected by Region:

1. Face:_____
2. Head:_____
3. Neck:_____
4. Chest:_____
5. Abdomen:_____
6. Arms:_____
7. Legs:_____
8. Hands:_____
9. Feet:_____
10. Other:_____

4. Skin Problems:

1. Striae:_____
2. Acanthosis Nigricans:_____
3. Facial Acne:_____
4. Back and/or Chest Acne:_____
5. Seborrheic Dermatitis:_____
6. Red Buchar Moles:_____
7. Spider Angiomas:_____

8. Cellulitis:_____

5. Skeletal deformation:

1) *Genu Varus*:_____

2) *Genu Valgus*:_____

3) *Scoliosis*:_____

4) *Kyphosis*:_____

5) *Lordosis*:_____

6) *Flat Feet*:_____

7) *Valgus Flat Feet*:_____

8) *Other*:_____

INSTRUCTIONS FOR COMPLETING QUESTIONNAIRE 2 – PHYSICAL EXAMINATION

Any obesity-related signs and/or characteristics must be indicated on this questionnaire.

- In question 1a, record blood pressure (systolic/diastolic).
- In question 1b, mark the appropriate skin color with an X.
- In question 2, indicate pubertal development based on Tanner's stages by marking the stage the child has reached with an X. Mark any secondary sex characteristics observed with an X as well. Do the same for menarche.
- In question 3, indicate, by region, any dysmorphic signs observed by the expert examiner.
- In question 4, mark any indicated skin problems with an X, if observed.
- In question 5, mark any indicated skeletal deformities with an X, if observed.

Questionnaire 3 – Biochemical Examination

Name _____ age _____ code _____
Sex _____ grade _____ school _____

1. Fasting Glucose Level: _____

2. Lipid Profile:

_____ cholesterol _____
_____ Triglycerides _____
_____ HDL _____
_____ LDL _____

3. Hemoglobin: _____

Questionnaire 4 – Physical Activity Survey (First):

Name _____ age _____ code _____
Sex _____ grade _____ school _____

1.a. How many of the past 7 days did the child participate in intense physical activity, such as running, fast bicycling, aerobics, or other intense activities for at least 10 minutes? _____ days (intense physical activity will be defined as any activity that noticeably increases rate of respiration)

1.a.1 Is this normal for the child? yes _____ no _____

1.b. When the child is involved in these types of intense physical activities, how much time does he or she spend in minutes? Minutes per day _____

2.a. How many of the past 7 days did the child participate in moderate physical activity, such as walking fast, riding a bicycle, or other moderate activities for at least 10 minutes each time? _____ days (moderate physical activity will be defined as any activity that causes a slight increase in rate of respiration)

2.a.1 Is this normal for the child? yes _____ no _____

2.b. When the child is involved in these types of moderate physical activities, how much time does he or she spend in minutes? Minutes per day _____

3.a. How much time does the child normally spend walking per day? ____ min

3.a.1 Is this normal for the child? yes _____ no _____

3.b. How much time does the child normally spend sitting down watching TV, playing computer games, chatting with friends, talking on the telephone, and doing similar activities? ____ min. (record the total time in minutes spent by the child doing these types of activities)

3.b.1 Is this normal for the child? yes _____ no _____

4. Indicate whether the child participates in sports, exercises, dancing, or games:

sport _____ time _____ sport _____ time _____
exercise _____ time _____ exercise _____ time _____
dancing _____ time _____ dancing _____ time _____
games _____ time _____ games _____ time _____

Classification _____

INSTRUCTIONS FOR QUESTIONNAIRE 4 – PHYSICAL ACTIVITY

This questionnaire is used to record information about the child's physical activity.

- Answer each question in the space provided
- This questionnaire is to be completed by the child's parents or guardians.
- Questions 1a, 1b, 2a, 2b, and 3a attempt to determine the child's participation in light, moderate, and intense physical activity.
- Question 3b attempts to determine the time spent in sedentary activities.
- Question 4 attempts to collect information about good physical activity habits.

Questionnaire 5 – Semiquantitative Food Frequency Chart (First):

Name _____ age _____ code _____

Sex _____ grade _____ school _____

Food	To be answered by the individual surveyed					To be completed by the researcher:		
	Frequency Number of times per				Average Serving	Number of Servings	code	Total (g) consumed per day
	Never	Day	Week	Month				
<u>Dairy Products</u>								
Whole Milk								
Low-Fat Milk								
Skim Milk								
Yogurt								
Yogurt with Sugar								
Ice Cream								
Non-Cream Frozen Desserts								
Fresh Cheese								
Yellow Cheese								
Soy Milk or Yogurt								
<u>Meats</u>								
Beef								
Pork								
Mutton								
Beef Tongue								
Liver								
Other Organs								
<u>Poultry</u>								
Chicken with Skin								
Skinless Chicken								
Turkey								
Chicken Liver								
<u>Meat Products</u>								
Ham								
Smoked Pork Loin								
Bacon								
Hot Dogs								
Other Sausages								
Blood Sausage								
<u>Eggs</u>								
Egg Yolks								
Egg Whites								
Whole Eggs								
<u>Fish</u>								
White-Meat Fish								
Dark-Meat Fish								
Sardines								
Tuna								
Other								
<u>Seafood</u>								
Squid								
Shrimp								
Lobster								
Other Seafood								
<u>Fat and Oil</u>								
Vegetable Oil								
Animal Fat								
Pork Rinds								
Butter								
Margarine								
Cream Cheese								

Avocado								
Legumes								
Garbanzo Beans								
Lentils								
Peas								
Beans								
Peanuts								
Olives								
Hazelnuts								
Walnuts or Pecans								
Almonds								
Sesame Seeds								
Chestnuts								
Cereals								
Cookies								
Crackers								
Hard Crust Breads								
Soft Crust Breads								
Whole Grain Breads								
Corn Flakes								
Corn Flour								
Puffed Wheat								
Oats								
Rice								
Pasta								
Whole Grain Pasta								
Other Cereals								
Vegetables								
Leafy Vegetables								
Yellow Vegetables								
Other Vegetables								
Fruits								
Oranges								
Tangerines								
Grapefruit								
Lemons/Limes								
Guava								
Papaya								
Tamarind								
Bananas								
Apples								
Pears								
Grapes								
Peaches								
Strawberries								
Plums								
Raspberries								
Pineapple								
Cantaloupe								
Mangos								
Mammee Apples (Mamey Fruit)								
Loquat Fruit								
Apricots								
Sweetsop (Sugar Apple)								
Cherimoya								
Soursop								
Other								
Dried Fruit								
Figs								
Raisins								
Dates								
Dried Coconut								
Other								
Tubers								
Potatoes								
Malanga								

Sweet Potatoes								
Yucca Root								
Yams								
Other								
Processed Foods and Cold Cuts								
Croquets								
French Fries								
Hamburgers								
Pizza								
Other Fast Foods								
Sugar and Sweets								
Chocolate Custard								
Custard made with Milk and Eggs								
Chocolate								
Pastechi (Turnovers)								
Cakes, pies, and tarts								
Chocolate Cake								
Fruit Jams								
Fruit Jellies								
Quince Paste								
Spring Rolls								
Sugar-Based Candies								
Sugar								
Soy Products								
Hamburgers								
Other Products								
Beverages								
Sodas								
Powdered Beverages								
Diet Beverages								
Malt Beverages (Malta)								
Beer								
Natural Fruit Juice								
Infusions (measured sugar)								
Wine								
Supplements								

Questionnaire 6 – Child’s Dietary History (First)

Name _____ dec. age _____ code _____
 Sex _____ grade _____ school _____ Date of Birth: _____

1. Breastfeeding:

a. Was Child Breastfed-----yes: _____(1) No: _____(2)

If yes, state:

b. Exclusive Breastfeeding, for _____ months

c. Mixed Milk Feeding, age started: _____ months, for: _____ months

2. Complementary Feeding:

Age at which foods other than milk were introduced:

Before 3 months: _____(1)

3 to 6 months _____(2)

7 to 12 months _____(3)

3. Meal Frequency

Meal	Daily(1)	times x wk (2)	Never (3)
Breakfast			
Mid-Morning Snack			
Lunch			
Afternoon Snack			
Dinner			
Supper			

4. Food Distribution Throughout The Day

4.1 Mark with an X

Meal	Which is the biggest meal of the day?	Which is the smallest meal the child eats during the day?
Breakfast (1)		
Mid-Morning Snack (2)		
Lunch (3)		
Afternoon Snack (4)		
Dinner (5)		
Supper (6)		

4.2. If breakfast is not normally eaten, please explain why:

- a) Lack of time_____ b) Does not like it_____
c) Causes digestive problems_____ d) Other_____

5. Antioxidant Quality of the Diet

a. How often are the following foods eaten?

Type of Food	Daily(1)	times x wk (2)	Never (3)
Fresh Green Vegetables			
Fresh Fruit			
Yellow Fruits and Vegetables			
Foods Containing Soy			

b. How often is the same oil used for frying?

1 time_____

2 times_____

3 or more_____

C.- When frying food, do you fry in covered containers?____

6. Taste and Preference

a. List three of your child's favorite foods:

b. List the three foods your child eats most often:

7. Is salt added to your child's food? _____

INSTRUCTIONS FOR QUESTIONNAIRE 6 – DIETARY HISTORY

This questionnaire is used to gather diet-related information for different times during the child's life.

- In question 1, mark whether the child was breastfed or not with an X.
- In question 1, section b, indicate the duration of exclusive breastfeeding with an X.
- In question 1, section c, indicate for how long the child was breastfed and given other types of milk.
- In question 2, indicate the age at which food other than milk was introduced.
- In question 3, place an X in the boxes corresponding to the frequency with which each type of meal is eaten.
- In question 4.1 place an X in the first column in the box corresponding to the largest meal of the day. Place an X in the second column to mark the lightest meal of the day.
- In question 4.2, mark the appropriate reason with an X.
- In question 5, section a, place an X in the boxes corresponding to the frequency with which each type of food is eaten.
- In question 5, section b, place an X in the variable of choice.
- In question 6, give the names of the foods in the space indicated.
- In question 7, answer yes or no.

Questionnaire 7 – Factors Related to Childhood Obesity

Name _____ age _____ code _____

Sex _____ grade _____ school _____

1. Characteristics of the Child:

a. Birth Weight _____

b. Illnesses

1.1. Obese or overweight since: Nursing Age _____ Preschool Age _____
School Age _____

1.2. Asthma _____

1.3. Difficulty breathing at night (apnea, snoring) _____

1.4. Diabetes _____

1.5. HTN _____

1.6. Heart Disease _____

1.7. Liver Disease _____

1.8. Gall Stones _____

1.9. Mental Retardation _____

1.10. Encephalopathy _____

1.11. Headaches _____

1.12. Hyperthyroidism _____

1.13. Genetic Disorders _____

1.14. Constipation _____

1.15. Hemorrhoids _____

1.16. Kidney Failure _____

1.17. Kidney Stones _____

1.18. Kidney Disease _____

1.19. Edema _____

1.20. Bulimia _____

1.21. Anorexia _____

1.22. Other _____ Describe: _____

c. School Achievement:

1. Sleeps in Class: Yes _____ No _____

2. Achievement: G _____ F _____ P _____

d. Regularly Takes Medicine:

1. Steroids _____

2. Vitamins _____

3. Anabolic Steroids _____

4. Supplements _____

5. Hormones _____

6. Antihistamines _____

7. Psychoactive Drugs _____

8. Anti-Seizure Medication_____

2. Family Medical History:

	2.1 Mother	2.2 Father
Age		
Schooling		
Occupation		
Illnesses, answer YES or NO		
Obesity		
Diabetes		
HTN		
Heart Disease		
Stroke		
High Cholesterol		

Legend

HTN: Arterial Hypertension

INSTRUCTIONS FOR COMPLETING QUESTIONNAIRE 7 – RELATED FACTORS

This questionnaire deals with health issues that may be related to obesity or may be affected by obesity. They may be indicators of primary or secondary causes of obesity or arise as a result of obesity.

The questionnaire is divided into two parts: the first dealing with health problems the child may have, and the second dealing with health problems the parents may have.

The instructions below explain how to answer the questions:

- a. Write the weight at birth given by the mother
- b. Mark all illnesses that apply with an X
- c. Mark all that apply with an X
- d. Indicate medications used with an X

Questionnaire 8 - School Conditions (First)

Date: _____

Name of School: _____

1. Areas are available for: sports_____, dancing_____, games_____
2. In-school physical education programs are offered ____
3. Time set aside each week per grade for physical education
1_____, 2_____, 3_____, 4_____, 5_____, 6_____
4. Extracurricular physical activity programs are offered:
Sports_____, dancing_____, games_____, individual activities_____
5. Time set aside each week for extracurricular physical activity:
1_____, 2_____, 3_____, 4_____, 5_____, 6_____
6. Sugary beverages, candy, and fried foods are offered at the school or nearby

7. Fruit, natural fruit juice, milk, or yogurt is offered at the school or nearby ____
8. Children walk to and from school _____
9. The school has sponsored healthy diet-oriented activities ___

Questionnaire 9 – Awareness and Opinions regarding Childhood Obesity (First)

Teachers ____, parents ____, food handlers ____, vendors ____

1. Is obesity common among children in Aruba? ____
2. Does childhood obesity affect health? ____
3. Is breakfast important for children? ____
4. Is it important to eat fruits and vegetables often? ____
5. Should sugary drinks, fried foods, and candy be avoided? ____
6. Is it good for children to spend a lot of time watching television or playing on the computer? ____
7. Is playing sports healthy for children? ____
8. Do you remember seeing or hearing any sort of educational message about obesity in the newspaper, on the radio, or on television? ____
9. Did any of these messages contribute to your current opinions about childhood obesity? ____
10. Did any of these messages make you more aware of children's diets or physical activity? ____

Questionnaire 10 – Educational Messages about Obesity

1. Number of messages in newspapers or magazines ___
2. Number of radio programs with educational messages ___
3. Number of television programs with educational messages ___
4. Number of media interviews about childhood obesity ___
5. Number of community activities ___

Questionnaire 11 – Anthropometric Evaluation (Second)

Name _____ dec. age _____ code _____

Weight = _____ Kg

Height = _____ cm

BMI = W / H^2 (m²) = _____ kg/m² BMI/Age = _____ percentile

Classification _____

Instructions for Questionnaire 1 – Anthropometric Evaluation

Work Team: Measurer and Recorder

Measurements to Be Made: Weight and Height

Measurement Method:

Requirements:

- Privacy
- Quiet environment
- Proper illumination
- Instruments in good condition and checked (calibrated, free of dust, readable)
- Measurements must be made during the morning (during the day, height decreases due to water loss in intervertebral cartilage)
- The measurer must not be given an expected range.

Weight

- Use double beam balance scale
- The individual must be dressed only in undergarments, without shoes or socks
- The individual must not be wearing casts or orthopedic devices
- Measurement must be made in Kg and grams

Height

- Stretch stature
- With the subject standing erect (at attention or in anthropometric position): with feet pointing outward at an angle of 45 degrees with arms relaxed at the sides of the body, palms facing inward
- Place the head in Frankfort plane position, which extends from the infraorbital rim (measuring from the left) to the upper margin of the left auditory canal
- The subject must be barefoot
- Touching the backboard, which must be vertical and flat, with no irregularities (if a wall is used, it must not have a baseboard)
- Measure from the floor to the crown of the subject's head
- Ask the subject to take a deep breath
- The measurement must be made in centimeters or meters

Questionnaire 12 – Physical Activity Survey (Second):

Name _____ age _____ code _____

1.a. How many of the past 7 days did the child participate in intense physical activity, such as running, fast bicycling, aerobics, or other intense activities for at least 10 minutes? _____ days (intense physical activity will be defined as any activity that noticeably increases rate of respiration)

1.a.1 Is this normal for the child? yes _____ no _____

1.b. When the child is involved in these types of intense physical activities, how much time does he or she spend in minutes? Minutes per day _____

2.a. How many of the past 7 days did the child participate in moderate physical activity, such as walking fast, riding a bicycle, or other moderate activities for at least 10 minutes each time? _____ days (moderate physical activity will be defined as any activity that causes a slight increase in rate of respiration)

2.a.1 Is this normal for the child? yes _____ no _____

2.b. When the child is involved in these types of moderate physical activities, how much time does he or she spend in minutes? Minutes per day _____

3.a. How much time does the child normally spend walking per day? ____ min

3.a.1 Is this normal for the child? yes _____ no _____

3.b. How much time does the child normally spend sitting down watching TV, playing computer games, chatting with friends, talking on the telephone, and doing similar activities? ____ min. (record the total time in minutes spent by the child doing these types of activities)

3.b.1 Is this normal for the child? yes _____ no _____

4. Indicate whether the child participates in sports, exercises, dancing, or games:

sport _____ time _____ sport _____ time _____
exercise _____ time _____ exercise _____ time _____
dancing _____ time _____ dancing _____ time _____
games _____ time _____ games _____ time _____

Classification _____

INSTRUCTIONS FOR QUESTIONNAIRE 4 – PHYSICAL ACTIVITY

This questionnaire is used to record information about the child's physical activity.

- Answer each question in the space provided
- This questionnaire is to be completed by the child's parents or guardians.
- Questions 1a, 1b, 2a, 2b, and 3a attempt to determine the child's participation in light, moderate, and intense physical activity.
- Question 3b attempts to determine the time spent in sedentary activities.

Question 4 attempts to collect information about good physical activity habits.

Questionnaire 13 – Semiquantitative Food Frequency Chart (Second):

Name _____ age _____ code _____

Food	To be answered by the individual surveyed					To be completed by the researcher:		
	Frequency Number of times per				Average Serving	Number of Servings	code	Total (g) consumed per day
	Never	Day	Week	Month				
<u>Dairy Products</u>								
Whole Milk								
Low-Fat Milk								
Skim Milk								
Yogurt								
Yogurt with Sugar								
Ice Cream								
Non-Cream Frozen Desserts								
Fresh Cheese								
Yellow Cheese								
Soy Milk or Yogurt								
<u>Meats</u>								
Beef								
Pork								
Mutton								
Beef Tongue								
Liver								
Other Organ Meats								
<u>Poultry</u>								
Chicken with Skin								
Skinless Chicken								
Turkey								
Chicken Liver								
<u>Meat Products</u>								
Ham								
Smoked Pork Loin								
Bacon								
Hot Dogs								
Other Sausages								
Blood Sausage								
<u>Eggs</u>								
Egg Yolks								
Egg Whites								
Whole Eggs								
<u>Fish</u>								
White-Meat Fish								
Dark-Meat Fish								
Sardines								
Tuna								
Other								
<u>Seafood</u>								
Squid								
Shrimp								
Lobster								
Other Seafood								
<u>Fat and Oil</u>								
Vegetable Oil								
Animal Fat								
Pork Rinds								
Butter								
Margarine								

Cream Cheese								
Avocado								
Legumes								
Garbanzo Beans								
Lentils								
Peas								
Beans								
Peanuts								
Olives								
Hazelnuts								
Walnuts or Pecans								
Almonds								
Sesame Seeds								
Chestnuts								
Cereals								
Cookies								
Crackers								
Hard Crust Breads								
Soft Crust Breads								
Whole Grain Breads								
Corn Flakes								
Corn Flour								
Puffed Wheat								
Oats								
Rice								
Pasta								
Whole Grain Pasta								
Other Cereals								
Vegetables								
Leafy Vegetables								
Yellow Vegetables								
Other Vegetables								
Fruits								
Oranges								
Tangerines								
Grapefruit								
Lemons/Limes								
Guava								
Papaya								
Tamarind								
Bananas								
Apples								
Pears								
Grapes								
Peaches								
Strawberries								
Plums								
Raspberries								
Pineapple								
Cantaloupe								
Mangos								
Mammee Apples (Mamey Fruit)								
Loquat Fruit								
Apricots								
Sweetsop (Sugar Apple)								
Cherimoya								
Soursop								
Other								
Dried Fruit								
Figs								
Raisins								
Dates								
Dried Coconut								
Other								
Tubers								
Potatoes								

Malanga								
Sweet Potatoes								
Yucca Root								
Yams								
Other								
Processed Foods and Cold Cuts								
Croquets								
French Fries								
Hamburgers								
Pizza								
Other Fast Foods								
Sugar and Sweets								
Chocolate Custard								
Custard made with Milk and Eggs								
Chocolate								
Pastechi (Turnovers)								
Cakes, pies, and tarts								
Chocolate Cake								
Fruit Jams								
Fruit Jellies								
Quince Paste								
Spring Rolls								
Sugar-Based Candies								
Sugar								
Soy Products								
Hamburgers								
Other Products								
Beverages								
Sodas								
Powdered Beverages								
Diet Beverages								
Malt Beverages (Malta)								
Beer								
Natural Fruit Juice								
Infusions (measured sugar)								
Wine								
Supplements								

Questionnaire 14 – Child’s Dietary History (Second)

Name _____ dec. age _____ code _____

Meal Frequency

<i>Meal</i>	<i>Daily(1)</i>	<i>times x wk (2)</i>	<i>Never (3)</i>
<i>Breakfast</i>			

Food Distribution Throughout The Day

<i>Meal</i>	<i>Which is the biggest meal of the day?</i>	<i>Which is the smallest meal the child eats during the day?</i>
<i>Breakfast (1)</i>		
<i>Mid-Morning Snack (2)</i>		
<i>Lunch (3)</i>		
<i>Afternoon Snack (4)</i>		
<i>Dinner (5)</i>		
<i>Supper (6)</i>		

If breakfast is not normally eaten, please explain why:

- b) Lack of time _____
- b) Does not like it _____
- d) Causes digestive problems _____
- d) Other _____

Antioxidant Quality of the Diet

How often are the following foods eaten?

<i>Meal</i>	<i>Daily(1)</i>	<i>times x wk (2)</i>	<i>Never (3)</i>
<i>Fresh Green Vegetables</i>			
<i>Fresh Fruit</i>			
<i>Yellow Fruits and Vegetables</i>			
<i>Foods Containing Soy</i>			

How often is the same oil used for frying?

1 time _____

2 times _____

3 or more _____

C.- When frying food, do you fry in covered containers? _____

Taste and Preference

a. List three of your child's favorite foods:

b. List the three foods your child eats most often:

7. Is salt added to your child's food? _____

INSTRUCTIONS FOR QUESTIONNAIRE 2 – DIETARY HISTORY

This questionnaire is used to gather diet-related information for different times during the child's life.

- In question 1, mark whether the child was breastfed or not with an X.
- In question 1, section b, indicate the duration of exclusive breastfeeding with an X.
- In question 1, section c, indicate for how long the child was breastfed and given other types of milk.
- In question 2, indicate the age at which food other than milk was introduced.
- In question 3, place an X in the boxes corresponding to the frequency with which each type of meal is eaten.
- In question 4.1 place an X in the first column in the box corresponding to the largest meal of the day. Place an X in the second column to mark the lightest meal of the day.
- In question 5, section a, place an X in the boxes corresponding to the frequency with which each type of food is eaten.
- In question 5, section b, place an X in the variable of choice.
- In question 6, give the names of the foods in the space indicated.

Questionnaire 15 - School Conditions (Second)

Date: _____

Name of School: _____

1. Areas are available for: sports____, dancing____, games____
2. In-school physical education programs are offered ____
3. Time set aside each week per grade for physical education
1____, 2____, 3____, 4____, 5____, 6____
4. Extracurricular physical activity programs are offered:
Sports____, dancing____, games____, individual activities____
5. Time set aside each week for extracurricular physical activity:
1____, 2____, 3____, 4____, 5____, 6____
6. Sugary beverages, candy, and fried foods are offered at the school or nearby
__
7. Fruit, natural fruit juice, milk, or yogurt is offered at the school or nearby ____
8. Children walk to and from school ____
9. The school has sponsored healthy diet-oriented activities __

**Questionnaire 16 – Understanding and Opinions about Childhood Obesity
(Second)**

Teachers ____, parents ____, food handlers ____, vendors ____

1. Is obesity common among children in Aruba? ____
2. Does childhood obesity affect health? ____
3. Is breakfast important for children? ____
4. Is it important to eat fruits and vegetables often? ____
5. Should sugary drinks, fried foods, and candy be avoided? ____
6. Is it good for children to spend a lot of time watching television or playing on the computer? ____
7. Is playing sports healthy for children? ____
8. Do you remember seeing or hearing any sort of educational message about obesity in the newspaper, on the radio, or on television? ____
9. Did any of these messages contribute to your current opinions about childhood obesity? ____
10. Did any of these messages make you more aware of children's diets or physical activity? ____

Table 1: Sample by age-grade, and sex

AGE-GRADE		SEX		Total
		F	M	
1	6 YEARS	286	285	571
2	7 YEARS	328	344	672
3	8 YEARS	302	353	655
4	9 YEARS	305	364	669
5	10 YEARS	335	331	666
6	11 YEARS	358	361	719
Total		1914	2038	3952

Table 2: Nutritional State Percentages by Sex for 6 to 11 Year-Old School Children.

Nutritional State	SEX								TOTAL			
	MALE				FEMALE							
	No.	%	LL	UL	No.	%	LL	UL	No.	%	LL	UL
Malnourished	89	4.4	3.4	5.3	90	4.7	3.7	5.7	179	4.5	3.8	5.2
Healthy	1138	55.8	53.7	58.0	1171	61.1	59.0	63.4	2309	58.4	56.9	60.0
Overweight	233	11.4	10.0	12.8	185	9.7	8.3	11.0	418	10.6	9.6	11.5
Obese	578	28.4	26.4	30.3	468	24.5	22.5	26.4	1046	26.5	25.1	27.9
Total	2038	100	-	-	1914	100	-	-	3952	100	-	-

Table 3: Nutritional State Percentages by Sex for 6 Year-Old School Children.

AGE 6 years	SEX								TOTAL			
	MALE				FEMALE							
	No.	%	LL	UL	No.	%	LL	UL	No.	%	LL	UL
Malnourished	11	3.9	1.4	6.3	12	4.2	1.7	6.7	23	4.0	2.3	5.7
Healthy	149	52.3	43.3	58.3	189	66.1	60.4	71.7	338	59.3	55.1	63.3
Overweight	52	18.2	13.6	22.9	35	12.2	8.3	16.2	87	15.2	12.2	18.3
Obese	73	25.6	20.4	30.9	50	17.5	12.9	22.1	123	21.5	18.1	25.0
Total	285	100.0	-	-	286	100.0	-	-	571	100.0	-	-

Table 4: Nutritional State Percentages by Sex for 7 Year-Old School Children.

AGE 7 years	SEX								TOTAL			
	MALE				FEMALE							
	No.	%	LL	UL	No.	%	LL	UL	No.	%	LL	UL
Malnourished	20	5.8	3.2	8.4	15	4.6	2.2	7.0	35	5.2	3.4	7.0

Healthy	232	67.5	62.3	72.5	217	66.2	60.9	71.4	449	66.8	63.2	70.5
Overweight	31	9.0	5.8	12.2	28	8.5	5.4	11.7	59	8.8	6.6	11.0
Obese	61	17.7	13.6	21.9	68	20.7	16.2	25.3	129	19.2	16.1	22.2
Total	344	100.0	-	-	328	100.0	-	-	672	100.0	-	-

Table 5: Nutritional State Percentages by Sex for 8 Year-Old School Children.

AGE 8 years	SEX								TOTAL			
	MALE				FEMALE							
	No.	%	LL	UL	No.	%	LL	UL	No.	%	LL	UL
Malnourished	11	3.1	1.2	5.1	22	7.3	4.2	10.4	33	5.0	3.3	6.8
Healthy	195	55.2	49.9	60.6	214	70.9	65.6	76.2	409	62.5	58.7	66.2
Overweight	20	5.7	3.1	8.2	11	3.6	1.4	5.9	31	4.7	3.0	6.4
Obese	127	36.0	30.8	41.1	55	18.2	13.7	22.7	182	27.8	24.3	31.3
Total	353	100.0	-	-	302	100.0	-	-	655	100.0	-	-

Table 6: Nutritional State Percentages by Sex for 9 Year-Old School Children.

AGE 9 years	SEX								TOTAL			
	MALE				FEMALE							
	No.	%	LL	UL	No.	%	LL	UL	No.	%	LL	UL
Malnourished	16	4.4	2.2	6.6	13	4.3	1.8	6.7	29	4.3	2.7	5.9
Healthy	201	55.2	50.0	60.5	178	58.4	52.7	64.1	379	56.7	52.8	60.5
Overweight	43	11.8	8.4	15.3	30	9.8	6.3	13.3	73	10.9	8.5	13.3
Obese	104	28.6	23.8	33.4	84	27.5	22.4	32.7	188	28.1	24.6	31.6
Total	364	100.0	-	-	305	100.0	-	-	669	100.0	-	-

Table 7: Nutritional State Percentages by Sex for 10 Year-Old School Children.

AGE 10 years	SEX								TOTAL			
	MALE				FEMALE							
	No.	%	LL	UL	No.	%	LL	UL	No.	%	LL	UL
Malnourished	11	3.3	1.2	5.4	18	5.4	2.8	7.9	29	4.4	2.7	6.0
Healthy	213	64.4	59.0	69.7	175	52.3	46.7	57.7	388	58.2	54.4	62.1
Overweight	26	7.8	4.8	10.9	41	12.2	8.6	15.9	67	10.1	7.7	12.4
Obese	81	24.5	19.7	29.3	101	30.1	25.1	35.2	182	27.3	23.9	30.8
Total	331	100.0	-	-	335	100.0	-	-	666	100.0	-	-

Table 8: Nutritional State Percentages by Sex for 11 Year-Old School Children.

AGE	11	SEX	TOTAL
-----	----	-----	-------

years	MALE				FEMALE							
	No.	%	LL	UL	No.	%	LL	UL	No.	%	LL	UL
Malnourished	20	5.5	3.0	8.0	10	2.8	0.9	4.6	30	4.2	2.6	5.7
Healthy	148	41.0	35.8	46.2	198	55.3	50.0	60.6	346	48.1	44.4	51.8
Overweight	61	16.9	12.9	20.9	40	11.2	7.8	14.6	101	14.0	11.4	16.7
Obese	132	36.6	31.5	41.7	110	30.7	25.8	35.6	242	33.7	30.1	37.2
Total	361	100.0	-	-	358	100.0	-	-	719	100.0	-	-

Table 9: Height/Age (H/A) Ratio Tendencies for School Children Studied

Nutritional Classification	No. of Children	High H/A Ratio
Malnourished	179	24 (12.8%)
Healthy	2309	336 (15.5%)
Overweight	418	88 (21%)
Obese	1046	416 (39.7%)
Total	3952	864 (22%)

Table 10: Central Obesity Based on Circumferences and Skinfolds

Anthropometric Classification	No. of Children	No. of children with increased WC/HC I	No. of children with TST/SST ratio < 1	No. of children with both pathologic indices
Overweight	418	272 (65%)	86 (20.5%)	35(8.3%)
Obese	1046	734 (70.1%)	509 (48.6%)	384(36.7%)

Table 11: Morbid Obesity by Age and Sex

Age (years)	Number of cases	Male		Female	
6	13	13	100 %	0	0
7	14	11	78.5%	3	21.5%
8	18	18	100%	0	0
9	21	15	71.4%	6	28.6%
10	21	17	80.9%	4	19.1%
11	37	21	56.7%	16	43.3%
TOTAL	124	95	76.6%	28	23.4%

Table 12: Obese and Healthy Children by Skin Color

Skin Color	Obese	Healthy

	No.	%	No.	%
White	541	51.7	1429	61.8
Brown	378	36.1	663	28.6
Black	127	12.2	217	9.5
Total	1046	100.0	2309	100.0

$$X^2 = 14.91 \text{ df} = 2 \text{ p} = 0.001$$

Table 13: Overweight and Healthy Children by Skin Color

Skin Color	Overweight		Healthy	
	No.	%	No.	%
White	237	56.6	1429	61.8
Brown	143	34.1	663	28.6
Black	38	9.1	217	9.5
Total	418	100.0	2309	100.0

$$X^2 = 2.56 \text{ df} = 2 \text{ p} = 0.278$$

Table 14: Obese and Healthy Children by Blood Pressure

Blood Pressure	Obese		Healthy	
	No.	%	No.	%
Normal	806	77.1	2099	90.9
Abnormal	240	22.9	210	9.1
Total	1046	100.0	2309	100.0

$$X^2 = 54.39 \text{ df} = 1 \text{ p} = 0.000$$

Table 15: Overweight and Healthy Children by Blood Pressure

Blood Pressure	Overweight		Healthy	
	No.	%	No.	%
Normal	372	88.9	2099	90.9
Abnormal	46	11.1	210	9.1
Total	418	100.0	2309	100.0

$$X^2 = 0.51 \text{ df} = 1 \text{ p} = 0.477$$

Table 16: Obesity and Healthy Children by Results of Physical Examination

Physical Examination	Obese		Healthy	
	No.	%	No.	%

Overweight	418	20 (4.7%)	13 (3.1%)	17 (4%)	81 (19.3%)	64 (15.3%)
Healthy	2309	27 (1.1%)	14 (0.6%)	74 (3.2%)	58 (2.5%)	275 (11.9%)
Malnourished	179	4 (2.2%)	0	1 (0.5%)	0	23 (12.8%)
Total	3952	149 (3.7%)	78 (1.9%)	105 (2.6%)	493 (12.4%)	548 (13.8%)

Table 19: Summary Table Showing the Most Common Orthopedic and Oral Deformities: Genu Valgus, Flat Feet, Scoliosis-Kyphosis, and Cavities.

Table 20: Lipid Profile Tendencies among School Children Studied

Classification	Normal	Pathologic	Total
Malnourished	15	5 (25%)	20
Healthy	149	34 (18.5%)	183
Overweight	23	9 (28.1%)	32
Obese	56	34 (37.7%)	90
Total	243 (74.7%)	82 (26.2%)	325

Table 21: Summary Table Showing Physical Activity and Food Energy Intake for School Children Studied

Intake	Phys	Anthropometric Classification	Total
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		Activity				
				Healthy	Overweight	Obese
Adequate	Phys Activit y	Act	106	0	0	106
		Sed	334	64	48	446
	Subtotal		440	64	48	552
Deficient	Phys Activit y	Act	4			4
		Sed	231			231
	Subtotal		235			235
Excessive	Phys Activit y	Act	205	29	56	290
		Sed	165	115	419	699
	Subtotal		370	144	475	989
Total			1045	208	523	1776

Table 22: Obese and Healthy Children by Physical Activity

Physical activity	Obese		Healthy	
	No.	%	No.	%
No	467	89.3	730	69.9
Yes	56	10.7	315	30.1
Total	523	100.0	1045	100.0

$\chi^2 = 72.898$ df = 1 p = 0.000

Table 23: Overweight and Healthy Children by Physical Activity

Physical activity	Overweight		Healthy	
	No.	%	No.	%
No	179	86.1	730	69.9
Yes	29	13.9	315	30.1
Total	208	100.0	1045	100.0

$\chi^2 = 22.86$ df = 1 p = 0.000

Table 24: Obese and Healthy Children by Calorie Intake

Calorie Intake	Obese		Healthy	
	No.	%	No.	%
Deficient	0	0.0	235	22.5
Adequate	48	9.2	440	42.1
Excessive	475	90.8	370	35.4
Total	523	100.0	1045	100.0

$\chi^2 = 437.659$ df = 2 p = 0.000

Table 25: Overweight and Healthy Children by Calorie Intake

Calorie Intake	Overweight		Healthy	
	No.	%	No.	%
Deficient	0	0.0	235	22.5
Adequate	64	30.8	440	42.1
Excessive	144	69.2	370	35.4
Total	208	100.0	1045	100.0

$\chi^2 = 100.70$ df = 2 p = 0.000

Table 26: Distribution of Obese and Healthy Children by Breastfeeding

Breastfeeding	Obese		Healthy	
	No.	%	No.	%
No	155	29.6	84	8.0
Yes	368	70.4	961	92.0
Total	523	100.0	1045	100.0

$\chi^2 = 125.86$ df = 1 p = 0.000

Table 27: Distribution of Overweight and Healthy Children by Breastfeeding

Breastfeeding	Overweight		Healthy	
	No.	%	No.	%
No	93	44.7	84	8.0
Yes	115	55.3	961	92.0
Total	208	100.0	1045	100.0

$\chi^2 = 192.33$ df = 1 p = 0.000

Table 28: Distribution of Obese and Healthy Children by Duration of Exclusive Breastfeeding

Duration / months	Obese		Healthy	
	No.	%	No.	%
< 4	406	77.6	606	58.0
4 – 6	39	7.5	258	24.7
> 6	78	14.9	181	17.3
Total	523	100.0	1045	100.0

$X^2 = 59.21$ df = 2 p = 0.000

Table 29: Distribution of Overweight and Healthy Children by Duration of Exclusive Breastfeeding

Duration / Months	Overweight		Healthy	
	No.	%	No.	%
< 4	165	79.3	606	58.6
4 – 6	6	2.9	258	24.7
> 6	37	17.8	181	17.3
Total	208	100.0	1045	100.0

$X^2 = 52.0$ df = 2 p = 0.000

Table 30: Distribution of Obese and Healthy Children by Age Mixed Breastfeeding Was Started

Age Started / months	Obese		Healthy	
	No.	%	No.	%
< 6	287	54.9	690	66.0
≥ 6	81	15.5	278	26.6
No	155	29.6	77	7.4
Total	523	100.0	1045	100.0

$X^2 = 142.58$ df = 2 p = 0.000

Table 31: Distribution of Overweight and Healthy Children by Age Mixed Breastfeeding Was Started

Age Started / months	Overweight		Healthy	
	No.	%	No.	%
< 6	83	39.9	690	66.0
≥ 6	32	15.4	278	26.6
No	93	44.7	77	7.4
Total	208	100.0	1045	100.0

$X^2 = 206.32$ df = 2 p = 0.000

Table 32: Distribution of Obese and Healthy Children by Duration of Mixed Breastfeeding

Duration / Months	Obese		Healthy	
	No.	%	No.	%
< 6	235	44.8	445	42.6
≥ 6	133	25.4	523	50.0
No	155	29.8	77	7.4
Total	523	100.0	1045	100.0

$X^2 = 169.19$ df = 2 p = 0.000

Table 33: Distribution of Overweight and Healthy Children by Duration of Mixed Breastfeeding

Duration / Months	Overweight		Healthy	
	No.	%	No.	%
< 6	69	33.2	445	42.6
≥ 6	46	22.1	523	50.0
No	93	44.7	77	7.4
Total	208	100.0	1045	100.0

$X^2 = 211.85$ df = 2 p = 0.000

Table 34: Distribution of Obese and Healthy Children by Total Breastfeeding

Total Breastfeeding	Obese		Healthy	
	No.	%	No.	%
No	155	29.6	77	7.4
Yes	368	70.4	968	92.6
Total	523	100.0	1045	100.0

$X^2 = 135.341$ df = 1 p = 0.000

Table 35: Distribution of Overweight and Healthy Children by Total Breastfeeding

Total Breastfeeding	Overweight		Healthy	
	No.	%	No.	%
No	93	44.7	77	7.4
Yes	115	55.3	968	92.6
Total	208	100.0	1045	100.0

$X^2 = 206.29$ df = 1 p = 0.000

Table 36: Distribution of Obese and Healthy Children by Age Other Foods Were Introduced

Age Introduced / Months	Obese		Healthy	
	No.	%	No.	%
< 3	4	0.8	13	1.2
3 – 6	458	87.5	796	76.2
7 – 12	61	11.7	236	22.6
Total	523	100.0	1045	100.0

$\chi^2 = 28.346$ df = 2 p = 0.000

Table 37: Distribution of Overweight and Healthy Children by Age Other Foods Were Introduced

Age Introduced / Months	Overweight		Healthy	
	No.	%	No.	%
< 3	1	0.5	13	1.2
3 – 6	162	77.9	796	76.2
7 – 12	45	21.6	236	22.6
Total	208	100.0	1045	100.0

$\chi^2 = 1.041$ df = 2 p = 0.594

Table 38: Summary Table Showing Distribution of Obese and Healthy Children by Meal Frequency

Meal	Obese						Healthy						χ^2	p
	Daily		Weekly		Never		Daily		Weekly		Never			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Breakfast	32	6.1	0	0.0	491	93.9	427	40.9	0	0.0	618	59.1	203.2	0.000
Mid-Morning Snack	522	99.8	1	0.2	0	0.0	104	99.8	2	0.2	0	0.0	*	1.000
Lunch	502	96.0	21	4.0	0	0.0	950	90.9	95	9.1	0	0.0	13.10	0.000
Afternoon Snack	383	73.3	19	3.6	121	23.1	751	71.9	46	4.4	248	23.7	0.640	0.726
Dinner	492	94.1	29	5.5	2	0.4	940	90.0	18	1.7	87	8.3	56.38	0.000
Supper	479	91.6	3	0.6	41	7.8	944	90.3	55	5.3	46	4.4	28.20	0.000

Table 39: Summary Table Showing Distribution of Overweight and Healthy Children by Meal Frequency

Meal	Overweight						Healthy						X ²	p
	Daily		Weekly		Never		Daily		Weekly		Never			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Breakfast	39	18.8	0	0.0	169	81.3	427	40.9	0	0.0	619	59.1	36.31	0.000
Mid-Morning Snack	208	100.0	0	0.0	0	0.0	104	99.8	2	0.2	0	0.0	0.3987	0.528
Lunch	205	98.6	3	1.4	0	0.0	950	90.9	95	9.1	0	0.0	13.035	0.0003
Afternoon Snack	141	67.8	14	6.7	53	25.5	751	71.9	46	4.4	248	23.7	2.59	0.274
Dinner	193	92.8	15	7.2	0	0.0	940	90.0	18	1.7	87	8.3	36.32	0.000
Supper	193	92.8	0	0.0	15	7.2	944	90.3	55	5.3	46	4.4	13.88	0.001

Table 40: Distribution of Obese and Healthy Children by Reasons for Skipping Breakfast

Reasons for Skipping Breakfast	Obese		Healthy	
	No.	%	No.	%
No Time	321	64.4	8	0.8
Does Not Like It	94	19.5	319	30.5
Other	76	16.1	291	27.8
Not Applicable	32	0	427	40.9
Total	523	100	1045	100.0

X² = 1082.674 df = 3 p = 0.000

Table 41: Distribution of Overweight and Healthy Children by Reasons for Skipping Breakfast

Reasons for Skipping Breakfast	Overweight		Healthy	
	No.	%	No.	%
No Time	1	0.5	3	0.3
Does Not Like It	75	36.1	126	12.1
Other	3	1.4	115	11.0
Not Applicable	129	62.0	801	76.7
Total	208	100.0	1045	100.0

$$\chi^2 = 84.34 \text{ df} = 3 \text{ p} = 0.000$$

Table 42: Distribution of Obese and Healthy Children by Largest Meal of the Day

Meal	Obese		Healthy	
	No.	%	No.	%
Breakfast	19	3.6	26	2.5
Lunch	26	5.0	475	45.4
Dinner	371	70.9	376	36.0
Supper	107	20.5	168	16.1
Total	523	100.0	1045	100.0

$$\chi^2 = 273.59 \text{ df} = 3 \text{ p} = 0.000$$

Table 43: Distribution of Overweight and Healthy Children by Largest Meal of the Day

Meal	Overweight		Healthy	
	No.	%	No.	%
Breakfast	1	0.5	26	2.5
Lunch	101	48.6	476	45.6
Dinner	87	41.8	375	35.9
Supper	19	9.1	168	16.1
Total	208	100.0	1045	100.0

$$\chi^2 = 10.85 \text{ df} = 3 \text{ p} = 0.013$$

Table 44: Summary Table Showing Distribution of Obese and Healthy Children by Frequency of Food Types Eaten

Type of Food	Obese						Healthy						χ^2	p
	Daily		Weekly		Never		Daily		Weekly		Never			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Fresh Green Vegetables	13	2.5	93	17.8	417	79.7	133	12.7	378	36.2	537	51.1	125.621	0.000
Fresh Fruit	18	3.4	321	61.4	184	35.2	287	27.5	501	47.9	257	24.6	129.301	0.000
Yellow	67	12.8	353	67.4	103	19.7	147	14.1	703	67.3	195	18.7	0.602	0.740

Fruits and Vegetables														
Foods Containing Soy	21	4.0	16	3.1	486	92.9	68	6.5	68	6.5	909	87.0	12.930	0.002

Table 45: Summary Table Showing Distribution of Overweight and Healthy Children by Frequency of Food Types Eaten

Type of Food	Overweight						Healthy						X ²	p
	Daily		Weekly		Never		Daily		Weekly		Never			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%		
Fresh Green Vegetables	3	1.4	23	11.1	18	87.5	133	12.7	378	36.2	534	51.1	94.76	0.000
Fresh Fruit	7	3.4	138	66.3	63	30.3	287	27.5	501	47.9	257	24.6	56.66	0.000
Yellow Fruits and Vegetables	15	7.2	125	60.1	68	32.7	147	14.0	703	67.3	195	18.7	23.93	0.000
Foods Containing Soy	6	2.9	9	4.3	19	92.8	68	6.5	68	6.5	909	87.0	5.86	0.053

Table 46: Distribution of Obese and Healthy Children by Number of Times the Same Fat Is Used for Frying

Number of Times the Same Fat Is Used for Frying.	Obese		Healthy	
	No.	%	No.	%
1 Time	290	55.5	549	52.5
2 Times	145	27.7	377	36.1
3 or More Times	88	16.8	119	11.4
Total	523	100.0	1045	100.0

$X^2 = 15.665$ df = 2 p = 0.000

Table 47: Distribution of Overweight and Healthy Children by Number of Times the Same Fat Is Used for Frying

Number of Times the Same Fat Is Used for Frying.	Overweight		Healthy	
	No.	%	No.	%
1 Time	121	58.2	549	52.5
2 Times	57	27.4	377	36.1

3 or More Times	30	14.4	119	11.4
Total	208	100.0	1045	100.0

$\chi^2 = 6.14$ df = 2 p = 0.046

Table 48: Distribution of Obese and Healthy Children by Whether Frying Is Done in a Covered Container

Frying Done in Covered Container	Obese		Healthy	
	No.	%	No.	%
Yes	237	45.3	591	56.6
No	286	54.7	454	43.4
Total	523	100.0	1045	100.0

$\chi^2 = 0.495$ df = 1 p = 0.482

Table 49: Distribution of Overweight and Healthy Children by Whether Frying Is Done in a Covered Container

Frying Done in Covered Container	Overweight		Healthy	
	No.	%	No.	%
Yes	95	45.7	454	43.4
No	113	54.3	591	56.6
Total	208	100.0	1045	100.0

$\chi^2 = 0.35$ df = 1 p = 0.554

Table 50: Summary Table Showing Distribution of Obese and Healthy Children by Preferred Foods

Type of Food	Obese				Healthy				χ^2	p
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
Dairy Products	218	41.7	305	58.3	200	19.1	845	80.9	90.604	0.000
Red Meat	160	30.6	363	69.4	456	43.6	589	56.4	24.862	0.000
Poultry	266	50.9	257	49.1	402	38.5	643	61.5	21.887	0.000
Seafood	22	4.2	501	95.8	8	0.8	1037	99.2	21.991	0.000
Fish	57	10.9	466	89.1	91	9.7	954	91.3	1.957	0.162
Cereals	523	100.0	0	0.0	315	30.1	730	69.9	683.613	0.000
Pasta	523	100.0	0	0.0	551	52.7	494	47.3	360.956	0.000

Legumes	17	3.3	506	96.7	33	3.2	1012	96.8	0.010	0.922
Eggs	3	0.6	520	99.4	29	2.8	1016	97.2	8.450	0.004
Fruits	27	5.2	496	94.8	29	2.8	1016	97.2	5.769	0.016
Vegetables	20	3.8	503	96.2	33	3.2	1012	96.8	0.474	0.491
Tubers	117	22.4	406	77.6	345	33.0	700	67.0	18.99	0.000

Table 51: Summary Table Showing Distribution of Overweight and Healthy Children by Preferred Foods

Type of Food	Overweight				Healthy				X ²	p
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
Dairy Products	82	39.4	126	60.6	200	19.1	845	80.9	40.92	0.000
Red Meat	71	34.1	137	65.9	456	43.6	589	56.4	6.43	0.011
Poultry	73	35.1	135	64.9	402	38.5	643	61.5	0.84	0.360
Seafood	26	12.5	182	87.5	8	0.8	1037	99.2	99.3	0.000
Fish	23	11.1	185	88.9	91	8.7	954	91.3	1.16	0.282
Cereals	96	46.2	112	53.8	315	30.1	730	69.9	20.17	0.000
Pasta	127	61.1	81	38.9	551	52.7	494	47.3	4.85	0.028
Legumes	5	2.4	203	97.6	33	3.2	1012	96.8	0.34	0.562
Eggs	3	1.4	205	98.6	29	2.8	1016	97.2	1.24	0.266
Fruits	26	12.5	182	87.5	29	2.8	1016	97.2	39.09	0.000
Vegetables	0	0.0	208	100.0	33	3.2	1012	96.8	6.75	0.009
Tubers	63	30.3	145	69.7	345	33.0	700	67.0	0.59	0.444

Table 52: Summary Table Showing Distribution of Obese and Healthy Children by Most Frequently Eaten Foods

Type of Food	Obese				Healthy				X ²	p
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
Dairy Products	4	0.8	519	99.2	238	22.8	807	77.2	129.377	0.000
Red Meat	157	30.0	366	70.0	285	27.3	760	72.7	1.299	0.254
Poultry	265	50.7	258	49.3	335	32.1	710	67.9	51.111	0.000
Fish	61	11.7	462	88.3	133	12.7	912	87.3	0.364	0.546
Cereals	228	43.6	295	56.4	459	43.9	586	56.1	0.015	0.902
Pasta	208	39.8	315	60.2	583	55.8	462	44.2	35.779	0.000
Legumes	60	11.5	463	88.5	112	10.7	933	89.3	0.203	0.652
Eggs	1	0.2	522	99.8	2	0.2	1043	99.8	0.000	1.000
Fruits	28	5.4	495	94.6	64	6.1	981	93.9	0.375	0.540
Vegetables	56	10.7	467	89.3	76	7.3	969	92.7	5.334	0.021

Tubers	57	10.9	466	89.1	191	18.3	854	81.7	14.25	0.000
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Table 53: Summary Table Showing Distribution of Overweight and Healthy Children by Most Frequently Eaten Foods

Type of Food	Overweight				Healthy				X ²	P
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
Dairy Products	1	0.5	207	99.5	238	22.8	807	77.2	55.86	0.000
Red Meat	70	33.7	138	66.3	285	27.3	760	72.7	3.47	0.062
Poultry	85	40.9	123	59.1	335	32.1	710	67.9	6.04	0.014
Fish	25	12.0	183	88.0	133	12.7	912	87.3	0.08	0.779
Cereals	68	32.7	140	67.3	459	43.9	587	56.1	8.98	0.003
Pasta	58	27.9	150	72.1	583	55.8	462	44.2	54.06	0.000
Legumes	6	2.9	202	97.1	112	10.7	933	89.3	13.54	0.000
Eggs	0	0.0	208	100.0	2	0.2	1043	99.8	0.399	0.529
Fruits	40	19.2	168	80.8	64	6.1	981	93.9	39.15	0.000
Vegetables	10	4.8	198	95.2	76	7.3	969	92.7	1.65	0.199
Tubers	4	1.9	204	98.1	191	18.3	854	81.7	35.31	0.000

Table 54: Distribution of Obese and Healthy Children by Addition of Salt to Food

Addition of Salt	Obese		Healthy	
	No.	%	No.	%
Yes	127	24.3	294	28.1
No	396	75.7	751	71.9
Total	523	100.0	1045	100.0

$X^2 = 2.632$ $df = 1$ $p = 0.105$

Table 55: Distribution of Overweight and Healthy Children by Addition of Salt to Food

Addition of Salt	Overweight		Healthy	
	No.	%	No.	%
Yes	65	31.3	294	28.1
No	143	68.8	751	71.9
Total	208	100.0	1045	100.0

$$\chi^2 = 1.51 \text{ df} = 1 \text{ p} = 0.218$$

Table 56: Distribution of Obese and Healthy Children by Birth Weight

Birth Weight	Obese		Healthy	
	No.	%	No.	%
Don't Remember	460	88.0	907	86.8
Underweight	14	2.7	26	2.5
Normal Weight	36	6.8	6	0.6
Overweight	13	2.5	106	10.1
Total	523	100.0	1045	100.0

$$\chi^2 = 78.834 \text{ df} = 3 \text{ p} = 0.000$$

Table 57: Distribution of Overweight and Healthy Children by Birth Weight

Birth Weight of Child	Overweight		Healthy	
	No.	%	No.	%
Don't Remember	89	40.8	907	86.8
Underweight	41	19.7	26	2.5
Normal Weight	15	7.2	6	0.6
Overweight	63	30.3	106	10.1
Total	208	100.0	1045	100.0

$$\chi^2 = 236.29 \text{ df} = 3 \text{ p} = 0.000$$

Table 58: Summary Table Comparing Child-Related Factors in Obese and Healthy Children

Characteristics of the Child	Obese				Healthy				χ^2	p
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
History of Overweight / Obesity	20	3.8	503	96.2	7	0.7	1038	99.3	9.004	0.0027
Bronchial Asthma	1	0.2	522	99.8	4	0.4	1041	99.6	*	0.6702

Sleep Apnea	0	0.0	523	100.0	1	0.1	1044	99.9	*	1.0000
Diabetes Mellitus	0	0.0	523	100.0	1	0.1	1044	99.9	*	1.0000
Headaches	1	0.2	522	99.8	5	0.5	1040	99.5	*	0.6702
Hyperthyroidism	0	0.0	523	100.0	1	0.1	1044	99.9	*	1.0000
Genetic Disorders	0	0.0	523	100.0	1	0.1	1044	99.9	*	1.0000
Constipation	1	0.2	522	99.8	2	0.2	1043	99.8	*	1.0000
Neuropathies	1	0.2	522	99.8	1	0.1	1044	99.9	*	1.0000
Bulimia	2	0.4	521	99.6	12	1.2	1033	98.8	*	0.1610

* Fisher Test

Table 59: Summary Table Comparing Child-Related Factors in Overweight and Healthy Children

Characteristics of the Child	Overweight				Healthy				X ²	P
	Yes		No		Yes		No			
	No.	%	No.	%	No.	%	No.	%		
History of Overweight / Obesity	9	4.3	199	95.7	7	0.7	1038	99.3	18.40	0.000
Bronchial Asthma	1	0.5	207	99.5	4	0.4	1041	99.6	*	1.000
Sleep Apnea	0	0.0	208	100.0	1	0.1	1044	99.9	*	1.000
Diabetes Mellitus	0	0.0	208	100.0	1	0.1	1044	99.9	*	1.000
Headaches	0	0.0	208	100.0	5	0.5	1040	99.5	*	1.000
Hyperthyroidism	0	0.0	208	100.0	1	0.1	1044	99.9	*	1.000
Genetic Disorders	0	0.0	208	100.0	1	0.1	1044	99.9	*	1.000
Constipation	0	0.0	208	100.0	2	0.2	1043	99.8	*	1.000
Bulimia	0	0.0	208	100.0	1	0.1	1044	99.9	*	1.000
Other	1	0.5	207	99.5	12	1.2	1033	98.8	*	1.000

* Fisher Test

Table 60: School Conditions that May Be Related to Childhood Obesity

	September, 2004	July, 2005
1. Areas are available for: sports, dancing, and games	8 yes	12 yes
2. In-school physical education classes are regularly offered	13 no	8 no
3. Time set aside each week per grade for physical education	variable	90 minutes in eight schools
4. Extracurricular physical activities offered:	15 no	10 no
5. Time set aside each week for extracurricular physical activity:		

6. Sugary beverages, candy, and fried foods are offered at the school or nearby	15 no	60 minutes in five schools
7. Fruit, natural fruit juice, milk, or yogurt is offered at the school or nearby	15 yes	12 yes
8. Children walk to and from school	15 no	12 yes
9. The school has sponsored healthy diet-oriented activities	15 no	15 no
	15 no	10 no

Table 61: Opinions and Awareness regarding Childhood Obesity September, 2004

Questions	Number and category of surveyed individuals				Total (%)
	Yes (%)	yes (%)	Yes (%)	yes (%)	
1. Is obesity common among children 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 breakfast important for children?	62 (67.3)	422 (20.7)	11 (21.1)	5 (17.8)	500 (22.6)
4. Is it important to eat fruits and vegetables often?	61 (66.3)	379 (18.6)	15 (28.8)	6 (21.4)	461 (20.8)
5. Should sugary drinks, fried foods, and candy be avoided?	61 (66.3)	309 (15.1)	8 (15.3)	4 (14.2)	382 (17.3)
6. Is it good for children to spend a lot of time watching television or playing on the computer?	82 (89.1)	1721 (84.6)	43 (82.6)	25 (89.2)	1871 (84.8)
7. Is playing sports healthy for children?	65 (70.6)	562 (27.6)	15 (28.8)	8 (28.5)	650 (29.4)
8. Do you remember any educational messages related to obesity?	(0)	(0)	(0)	(0)	(0)
9. Did any of these messages help to					

change your opinion?					
10. Did any of these messages change your awareness of children?					
Total	92 teachers	2034 parents	52 food handlers	28 vendors	2206

Table 62. Opinions and Awareness regarding Childhood Obesity July, 2005

Questions	Number and category of surveyed individuals				Total (%)
	Yes (%)	yes (%)	Yes (%)	yes (%)	
1. Is obesity common among children in Aruba?	85 (92.3)	1097 (53.9)	31 (59.6)	14 (50.0)	1227 (55.6)
2. Does childhood obesity affect health?	89 (96.7)	939 (46.1)	28 (53.8)	16 (57.1)	1072 (48.5)
3. Is breakfast important for children?	85 (92.3)	891 (43.8)	31 (59.6)	16 (57.1)	1023 (46.3)
4. Is it important to eat fruits and vegetables often?	85 (92.3)	1104 (54.2)	31 (59.6)	26 (92.8)	1246 (56.4)
5. Should sugary drinks, fried foods, and candy be avoided?	89 (96.7)	894 (43.9)	25 (48.0)	14 (50.0)	1022 (46.3)
6. Is it good for children to spend a lot of time watching television or playing on the computer?	32 (34.7)	1007 (49.5)	23 (44.2)	16 (57.1)	1078 (48.8)
7. Is playing sports healthy for children?	89 (96.7)	895 (44.0)	31 (59.6)	18 (64.2)	1033 (46.8)
8. Do you remember any educational messages related to obesity?	76 (82.6)	923 (45.3)	25 (48.0)	15 (53.5)	1039 (47.0)
9. Did any of these messages help to change your opinion?	34 (36.9)	417 (20.5)	23 (44.2)	14 (50.0)	488 (22.1)
10. Did any of these messages change your awareness of children?	12 (13.0)	201 (9.8)	13 (25.0)	8 (28.5)	234 (10.6)
Total	92	2034	52	28	2206

	teacher s	parents	food handler s	vendor s	
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Table 63: Results of First and Second Anthropometric Classifications

Anthropometric Classification	First Classification in September. 2004	Second Classification in July. 2005	Observations
Healthy	1045 (58.8%)	1034 (58.2%)	22 became overweight
Overweight	208 (11.7%)	224 (12.6%)	11 became healthy
Obese	523 (29.4%)	518 (29.2%)	5 became overweight
Total	1776	1776	38 changed classification

Table 64: Behavioral Changes in 1776 School Children Studied

Variables	Children Showing	Children Showing Negative
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	Positive Results		Results	
	number	percentage	number	percentage
Breakfast from never to daily	69	3.8	0	0
Heaviest meal from dinner to lunch	67	3.7	0	0
Vegetable consumption from never to weekly	8	0.4	0	0
Vegetable consumption from never to daily	19	1.0	0	0
Fruit consumption from weekly to daily	7	0.3	0	0
Fruit consumption from never to daily	20	1.1	0	0
Yellow vegetable consumption from never to daily	32	1.8	0	0
Excess energy intake reduced to proper energy intake (overweight children)	3	0.1	0	0
Excess energy intake reduced to proper energy intake (obese children)	4	0.2	0	0
Sedentary to active (overweight children)	6	0.3	0	0
Sedentary to active (obese children)	7	0.3	0	0
Other variables	0	0	0	0

SPECIAL RISK FACTOR TABLES

EVALUATION OF OBESITY RISK FACTORS

VARIABLES	χ^2	DEGREES OF FREEDOM	P
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Age	* - 3.25	-	0.001
Sex	0.390	1	0.532
Breastfeeding	125.86	1	0.000
Duration of Exclusive Breastfeeding	59.21	2	0.000
Age Mixed Milk Feeding Started	142.58	2	0.000
Duration of Mixed Milk Feeding	169.19	2	0.000
Total Breastfeeding	135.34	1	0.000
Age Complementary Feeding Started	28.35	2	0.000
Frequency of Breakfast	203.21	2	0.000
Frequency of Mid-Morning Snack	**	-	1.000
Frequency of Lunch	13.11	2	0.000
Frequency of Afternoon Snack	0.64	2	0.726
Frequency of Dinner	56.38	2	0.000
Frequency of Supper	28.21	2	0.000
Frequency of Green Vegetable Consumption	125.62	2	0.000
Frequency of Fresh Fruit Consumption	129.301	2	0.000
Frequency of Yellow Fruit and Vegetable Consumption	0.602	2	0.740
Frequency of Consumption of Foods Containing Soy	12.93	2	0.002
Frequency of Frying Fat Reuse	15.67	2	0.025
Physical Activity	72.90	1	0.000
Calorie Intake	437.66	2	0.000

* Z test for comparison of 2 means.

** Fisher Test

**Summary Table Showing Univariate Analysis for Variable Selection
Correlation Coefficient Values of Selected Explanatory Variables**

Variables	Variables																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1.00	.135	.189	.293	.192	.142	.168	.134	.182	.346	.278	.204	.337	.334	.235	.091	.298
2	-	1.00	.314	.983	.980	.978	.146	.105	-.10	.118	.112	.159	.225	.127	.157	.073	.161
3	-	-	1.00	.867	.313	.310	.156	.160	.189	.228	.214	.291	.166	.255	.267	.023	.096
4	-	-	-	1.00	.998	.995	.245	.111	.210	.240	.222	.209	.264	.214	.298	.078	.183

VARIABLES
1. Age
2. Breastfeeding
3. Duration of Exclusive Breastfeeding
4. Age Mixed Milk Feeding Started
5. Duration of Mixed Milk Feeding
6. Total Breastfeeding
7. Age Complementary Feeding Started
8. Frequency of Breakfast
9. Frequency of Lunch
10. Frequency of Dinner
11. Frequency of Supper
12. Frequency of Green Vegetable Consumption
13. Frequency of Fresh Fruit Consumption
14. Frequency of Consumption of Foods Containing Soy
15. Frequency of Frying Fat Reuse
16. Physical Activity
17. Calorie Intake

Variables Selected Using Wald Test on Logistic Model Run

VARIABLES	B Coefficients	B Exp	Wald Statistic	Degrees of Freedom	P
Age	-0.223	0.057	15.387	1	0.000
Breastfeeding	0.795	0.291	7.473	1	0.006
Duration of Exclusive Breastfeeding	-	-	18.722	2	0.00
Exclusive Breastfeeding less than 4 Months	1.113	0.263	17.937	1	0.00
Exclusive Breastfeeding over 6 Months	0.299	0.315	0.900	1	0.343
Age Complementary Feeding Started	-	-	18.098	2	0.000
Complimentary Feeding before 3 Months	1.397	1.030	1.842	1	0.175

Complementary Feeding between 3 and 6 Months	1.204	0.284	17.971	1	0.000
Frequency of Breakfast	0.928	0.144	41.446	1	0.000
Frequency of Lunch	-1.426	0.403	12.504	1	0.000
Frequency of Dinner	-	-	33.751	2	0.000
Weekly	-3.06	0.872	12.325	1	0.000
Never	-4.101	0.828	24.522	1	0.000
Frequency of Supper	-	-	26.377	2	0.000
Daily	-3.025	0.756	16.023	1	0.000
Weekly	-4.394	0.872	25.397	1	0.000
Frequency of Green Vegetable Consumption	-	-	5.15	2	.076
Frequency of Fresh Fruit Consumption	-	-	11.718	2	0.003
Occasional Fruit	1.045	0.380	7.575	1	0.006
No Fruit	1.351	0.395	11.718	1	0.001
Frequency of Consumption of Foods Containing Soy	-	-	5.816	2	0.055
Frequency of Frying Fat Reuse	-	-	6.251	2	.044
Fries 2 times	0.248	0.231	1.159	1	0.282
Fries 3 or more times	0.722	0.296	5.958	1	0.015
Physical Activity	2.579	0.218	139.483	1	0.000
Calorie Intake	-	-	205.108	2	0.000
Deficient Intake	-8.036	9.399	0.731	1	0.393
Excess Intake	3.238	0.227	204.078	1	0.000

VARIABLES	B Coefficients	B Exponents	CONFIDENCE INTERVAL B Exponents	
			LOWER LIMIT	UPPER LIMIT
Age	-0.223	0.80	0.72	0.89
Breastfeeding	0.795	2.22	1.25	3.92
Duration of Exclusive Breastfeeding	-			
Exclusive Breastfeeding less than 4 Months	1.113	3.04	1.82	5.10
Ablactation Age	-			
Ablactation between 3 and 6 Months	1.204	3.33	1.91	5.82
Frequency of Breakfast	0.928	2.53	1.91	3.36
Frequency of Lunch	-1.426	0.24	0.11	0.53
Frequency of Dinner	-			
Weekly	-3.06	0.05	0.01	0.26
Never	-4.101	0.02	0.003	0.084
Frequency of Supper	-			
Daily	-3.025	0.05	0.01	0.21
Weekly	-4.394	0.01	0.002	0.07
Frequency of Fresh Fruit	-			

Consumption				
Occasional Fruit	1.045	2.842	1.351	5.98
No Fruit	1.351	3.86	1.78	8.37
Frequency of Frying Fat Reuse	-			
Fries 3 or More Times	0.722	2.06	1.15	3.67
Physical Activity	2.579	13.18	8.59	20.22
Calorie Intake	-			
Excess Intake	3.238	25.49	16.35	39.76

Results of Logistic Regression:

Hosmer and Lemeshow Test Results	
χ^2	12.884
Degrees of Freedom	8
P	0.116

Results of Goodness of Fit Test for the Model

Summary Table Showing Univariate Analysis for Variable Selection

VARIABLES	χ^2	DEGREES OF FREEDOM	P
Age	• - 1.1 1	-	0.266
Sex	3.85	1	0.050
Breastfeeding	192.33	1	0.000
Duration of Exclusive Breastfeeding	52.0	2	0.000
Age Mixed Milk Feeding Started	206.32	2	0.000
Duration of Mixed Milk Feeding	211.85	2	0.000
Total Breastfeeding	206.29	1	0.000
Age Complementary Feeding Started	1.041	2	0.594
Frequency of Breakfast	36.31	2	0.000
Frequency of Mid-Morning Snack	0.399	2	0.819
Frequency of Lunch	14.08	2	0.001
Frequency of Afternoon Snack	2.59	2	0.274
Frequency of Dinner	36.32	2	0.000
Frequency of Supper	13.88	2	0.001
Frequency of Green Vegetable Consumption	94.76	2	0.000
Frequency of Fresh Fruit Consumption	56.66	2	0.000
Frequency of Yellow Fruit and Vegetable Consumption	23.93	2	0.000
Frequency of Consumption of Foods Containing Soy	5.86	2	0.053
Frequency of Frying Fat Reuse	6.14	2	0.046
Physical Activity	22.86	1	0.000
Calorie Intake	100.70	2	0.000

- T test for comparison of 2 means.

Variables:

1. Sex
2. Breastfeeding
3. Duration of Exclusive Breastfeeding
4. Age Mixed Milk Feeding Started
5. Duration of Mixed Milk Feeding
6. Total Breastfeeding
7. Frequency of Breakfast
8. Frequency of Lunch
9. Frequency of Dinner
10. Frequency of Supper
11. Frequency of Green Vegetable Consumption
12. Frequency of Fresh Fruit Consumption
13. Frequency of Yellow Fruit and Vegetable Consumption
14. Frequency of Frying Fat Reuse
15. Physical Activity
16. Calorie Intake

Variables Selected Using Wald Test on Logistic Model Run

VARIABLES	B Coefficients	B Exp	Wald Statistic	Degrees of Freedom	P
Sex	.674	.228	8.739	1	0.003
Breastfeeding	1.706	.301	34.151	1	0.000
Duration of Exclusive Breastfeeding	-	-	36.364	2	0.000
Exclusive Breastfeeding less than 4 Months	2.250	.475	22.461	1	0.000
Exclusive Breastfeeding over 6 Months	3.042	.504	36.364	1	0.000
Frequency of Breakfast	-	-	0.015	1	0.902
Frequency of Lunch	-	-	7.504	2	0.023
Weekly Lunch	-1.904	0.697	7.503	1	0.006
No Lunch	8.619	273.139	0.001	1	0.975
Frequency of Dinner	-	-	2.57	2	0.879
Frequency of Supper	-	-	0.122	2	0.941
Frequency of Vegetable Consumption	-	-	22.601	2	0.000
Occasional Vegetables	-1.217	0.688	3.128	1	0.077
No Vegetables	1.508	0.331	20.809	1	0.000
Frequency of Fresh Fruit Consumption	-	-	15.302	2	0.000
No Fruit	1.975	.521	14.354	1	0.000
Occasional Fruit	1.953	.523	13.957	1	0.000
Frequency of Frying Fat Reuse	-	-	17.953	2	0.000
Fries 2 Times	0.430	0.270	2.351	1	0.125
Fries 3 or More Times	1.549	0.366	17.952	1	0.000
Physical Activity	2.057	0.273	56.805	1	0.000
Calorie Intake	-	-	46.484	2	0.000
Deficient Intake	-8.972	15.335	0.342	1	0.559
Excess Intake	1.569	0.231	46.083	1	0.000

Results of Logistic Regression

VARIABLES	B Coefficients	B Exponents	CONFIDENCE INTERVAL B Exponents	
			LOWER LIMIT	UPPER LIMIT
Sex	.674	1.96	1.26	3.07
Breastfeeding	1.706	5.81	3.22	10.49
Duration of Exclusive Breastfeeding	-	-	-	-
Exclusive Breastfeeding less than 4 Months	2.250	9.49	3.74	24.08
Exclusive Breastfeeding over 6 Months	3.042	20.94	7.79	56.29
Weekly Lunch	-1.904	0.149	0.038	0.582
Frequency of Green Vegetable Consumption	-	-	-	-
No Vegetables	1.508	4.52	8.620	2.360
Frequency of Fresh Fruit Consumption	-	-	-	-
Occasional Fruit	1.975	7.21	2.59	20.03
No Fruit	1.953	7.05	2.53	19.65
Frequency of Frying Fat Reuse	-	-	-	-
Fries 3 or More Times	1.549	4.71	2.30	9.64
Physical Activity	2.057	7.83	4.58	13.36
Calorie Intake	-	-	-	-
Excess Intake	1.569	4.80	3.05	7.56

Results of Goodness of Fit Test for the Model

Hosmer and Lemeshow Test Results	
χ^2	4.270

Degrees of Freedom	8
P	0.832