

Nutritional status and blood pressure assessment in vulnerable children from two schools in Cutral Co and Plaza Huincul. A quantitative and qualitative study

Martín Sapag, M.D.^a, Carolina Dioverti, M.D.^a, Lorena Paramio, M.D.^a, Ana Petronace, M.D.^a, Florencia Rao, Nurse^a, Alejandra Aroca, Nurse^a, Sonia Figueroa, B.S.^a, Roberto Llancaqueo, Nurse^a, Carolina Mussin, M.D.^a, Gabriela Shell, Engineering Student^a, Leonardo Tapia, Social Worker^a, and Jorgelina Parola, M.D.^a

ABSTRACT

Introduction. Knowing the nutritional status of children is critical to plan primary health care interventions in the setting of the present obesity epidemic and the great increase in the prevalence of childhood metabolic syndrome.

For this reason, nutritional status and blood pressure were assessed among children from two schools of high social vulnerability, results were qualitatively analyzed, and community members feedback was obtained in order to be fully aware of the situation and accordingly plan local health interventions.

Population and methods. Cross-sectional study conducted at purposively selected schools, with results analyzed using focus groups.

The following standards were used: the World Health Organization (WHO) growth standards for weight and height; the National Center for Health Statistics (NCHS) for body mass index (BMI); the National Institutes of Health (NIH) for blood pressure; and Fernández J., et al. standards for waist circumference.

Results. Three hundred and sixty one children were evaluated; of them, 20.8% were overweight, 22.2% were obese and 6.5% were hypertensive. Obesity was more prevalent in boys ($p: 0.039$), and no relationship was observed between hypertension and central obesity with age and sex. The social factors that influence this situation were described by community representatives.

Conclusions. It was established that this population was malnourished and had a high prevalence of obesity. Results were analyzed by community members who focused on the items to be considered for the intervention.

Key words. prevention and control, school health, anthropometry, obesity.

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INTRODUCTION

The relevance of a collective assessment of children's nutritional status lays in that results obtained in a specific community are representative of factors related to upbringing and diet conditions.

Therefore, the way children grow is also indicative of whether their rights are being warranted and provides input on how to plan local primary care actions.

It is known that, at a national and provincial level, obesity has become highly prevalent and relatively important in terms of short stature and malnutrition in the pediatric population, and this has also been demonstrated worldwide by the emergence of a true obesity epidemic.³

In addition, a consensus of international experts has underscored the significance of screening for the metabolic syndrome in children, a condition related to the development of diabetes and cardiovascular disease in adults, consisting of several risk factors including arterial hypertension, obesity, hyperglycemia and dyslipidemia.⁴

Based on these prior concepts, we decided to assess nutritional status and blood pressure at two schools located in Cutral Co and Plaza Huincul, purposively selected for this intervention for two reasons: they are located in neighborhoods with a high social vulnerability where serious family and community violence episodes are commonplace.⁵⁻⁹ Such violence led to the temporary shut down of the neighborhood schools and health care center and the discontinuation of other community activities during the study period. Besides, both schools evidenced a high motivation to network, taking part in promotion and prevention activities together with the local health

a. Hospital Cutral
Co-Plaza Huincul.
Neuquén, Argentina

E-mail Address:
Martín Sapag M.D.,
canaan_2@yahoo.com.ar

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care center,¹⁰ enabling counseling in health situations that combine biological and social problems.

The educational community became an active player in the project, which combined a quantitative assessment and a qualitative analysis using focus groups. The objective of this methodological triangulation was to obtain the most of results so as to become aware of social actors opinions regarding the health status of children, because underlying ideas are critical for primary healthcare planning.¹¹

OBJECTIVES

To conduct an anthropometric evaluation of metabolic syndrome indicators among male and female students attending primary school No. 63 in Cutral Co and primary school No. 334 in Plaza Huincul.

To identify community members opinions on the causes of quantitative results.

POPULATION AND METHODS

Study conducted between September 2012 and April 2013 at two primary schools in Cutral Co and Plaza Huincul, purposively selected among 25 primary schools in both cities.

The decision to carry out the study and the selection of outcome measures to be examined was made during the community network meetings held at Hospital Cutral Co-Plaza Huincul, with the participation of teachers from both schools.

The aim was to evaluate more than 90% of students from each school, with 162 students enrolled at school No. 334 and 216 enrolled at school No. 63.

The perspective of rights implied in this study influenced the selection of reference standards. At present, the population younger than six years old is assessed as per the World Health Organization (WHO) prescriptive standards,¹² adopted by the Ministry of Health of the Republic of Argentina¹³ and adhered to by the Sociedad Argentina de Pediatría (SAP).¹⁴ However, for the population older than six years old, there are no ideal international growth standards available, only national descriptive standards for weight and height, and the WHO and National Center for Health Statistics (NCHS) standards for body mass index (BMI).

Therefore, in this study, it was agreed to use WHO standards for weight and height, adjusted as per international references for children younger than six years old¹⁵ and because they are

the more demanding than national standards.

In order to warrant viability, waist circumference and blood pressure were selected as metabolic syndrome indicators according to Fernández J. R., et al. references¹⁶ and reference patterns recommended by the National Institutes of Health (NIH),¹⁷ respectively.

Results obtained during the quantitative stage were analyzed by representatives of the educational community using the focus group technique.¹⁸

Design

Cross-sectional study with an analysis of focus groups data.

Quantitative stage

Inclusion criteria: first through seventh grade students from selected schools.

Exclusion criteria: students with specific growth standard conditions different from those of the general population (for example, Down's syndrome).

Outcome measures

Weight and height: measured with a beam scale with a capacity up to 150 kg and 100 g precision, with the child wearing light clothing and barefoot. The stadiometer attached to the scale was used, which has 1 mm precision. BMI (weight/height²) and height-for-age and weight-for-age percentiles were estimated.

Cut-off points for overweight and obesity were the 85th and 97th percentiles, respectively, while the 3rd percentile was considered for short stature and underweight.

Waist circumference: measured using a tape measure positioned at the right superior border of the iliac crest, and using the 90th percentile as the cut-off point.

Blood pressure: measured using an aneroid sphygmomanometer with a cuff size in relation to arm circumference and the child sitting down. Values were classified according to the age, sex and height; values under the 90th percentile were considered normal blood pressure, values between the 90th and 95th percentiles were considered prehypertension, values between the 95th and 99th percentiles were considered stage 1 hypertension, and above the 99th percentile, stage 2 hypertension.

A team of field operators (nurses, teachers and doctors) was trained on measurement techniques based on SAP recommendations.¹⁹

Average and dispersion values (standard deviation, Z-score and sampling range) were estimated to analyze anthropometric and blood pressure data. The EpiInfo software, version 3.5.3., was used for univariate and bivariate analyses. Plots were prepared in Microsoft Office Excel 2007.

Qualitative stage

Teachers, students and their parents, and local healthcare agents were convened. Children and parents were randomly selected by drawing lots using the quantitative stage data, warranting the inclusion of obese and non-obese children. Teachers and healthcare agents attended the meetings once designated by their chiefs and directors and according to services they provided.

All participating adults were administered a survey on cardiovascular risk factors²⁰ (Annex 1); this survey is used by the Health Department of Neuquén (SSPN) for preselecting cardiovascular risk patients in the city of Neuquén,²¹; afterwards their weight and height were measured. The results of this evaluation were shown during the meeting for participants to focus on them.

Initially, the reasons and objectives of the study were explained, results were presented on a Power Point file which was easy to understand by participating children and adults who then were invited to divide into groups according to their role, coordinated and guided by two trained participants. The script included an open question oriented to knowing participants' opinions on the described problem and other close-ended questions to look into the causes of the research findings.

Each group designated a spokesperson, who shared the findings at the end of the activity in order to draw common conclusions.

Participants' opinions were processed by the research team, who focused on general causes of obesity, differences in relation to sex and results obtained regarding the sample height.

Ethical considerations: The SSPN approved the project by Resolution No. 1562/12. Directors and parents signed an informed consent and participating children gave their assent.

Quantitative stage results

Three hundred and sixty one children from both schools were evaluated, accounting for 93.8% of all students from school No. 334 and 96.7% from school No. 63. Five children were not evaluated because their parents did not give

their consent and twelve because they missed school on the day of measurement. Personal and anthropometric characteristics of children are described in *Table 1*.

Results are complemented with frequency distribution curves of height and BMI, showing a relationship with reference patterns. The distribution curve of height-for-age (*Figure 1*) showed an almost perfect agreement with the WHO curve, with a median of -0.07 standard deviations in relation to the reference and a standard deviation of 1.02. In addition, the curve of BMI-for-age showed a deviation towards overweight and obesity (*Figure 2*), with a bimodal distribution and statistically significant differences for sex, with higher overweight and obesity values in boys (X²: 8.3, *p*: 0.039).

No statistically significant differences were observed when comparing sex and height or sex and waist circumference. Likewise, no statistically significant differences were found when establishing a relationship between age

TABLE 1. Personal characteristics and distribution by anthropometric outcome measures and clinical indicators of metabolic syndrome in male and female children from schools No. 63 and 334 in Cutral Co and Plaza Huincul, year 2012, n: 361

Outcome measure	Values
Age (years)	
Range	6-15
Average	10
Median	9.96
Sex	
Female	187 (51.9%)
Male	174 (48.1%)
Children evaluated by school	
No. 63	209 (57.9%)
No. 334	152 (42.1%)
Body mass index	
Standard	206 (57.1%)
Overweight	75 (20.8%)
Obesity	62 (17.2%)
Severe obesity	18 (5%)
Low weight	0 (0%)
Tall stature	10 (2.8%)
Abdominal circumference	
Lower than or equal to 90th percentile	286 (78.9%)
Higher than 90th percentile	75 (21.1%)
Blood pressure	
Normal	337 (93.3%)
Prehypertensive	19 (5.2%)
Stage 1 Hypertension	5 (1.3%)
Stage 2 hypertension	0 (0%)

FIGURE 1. Distribution of height/age of students from schools No. 63 and 334 in Cutral Co and Plaza Huincul

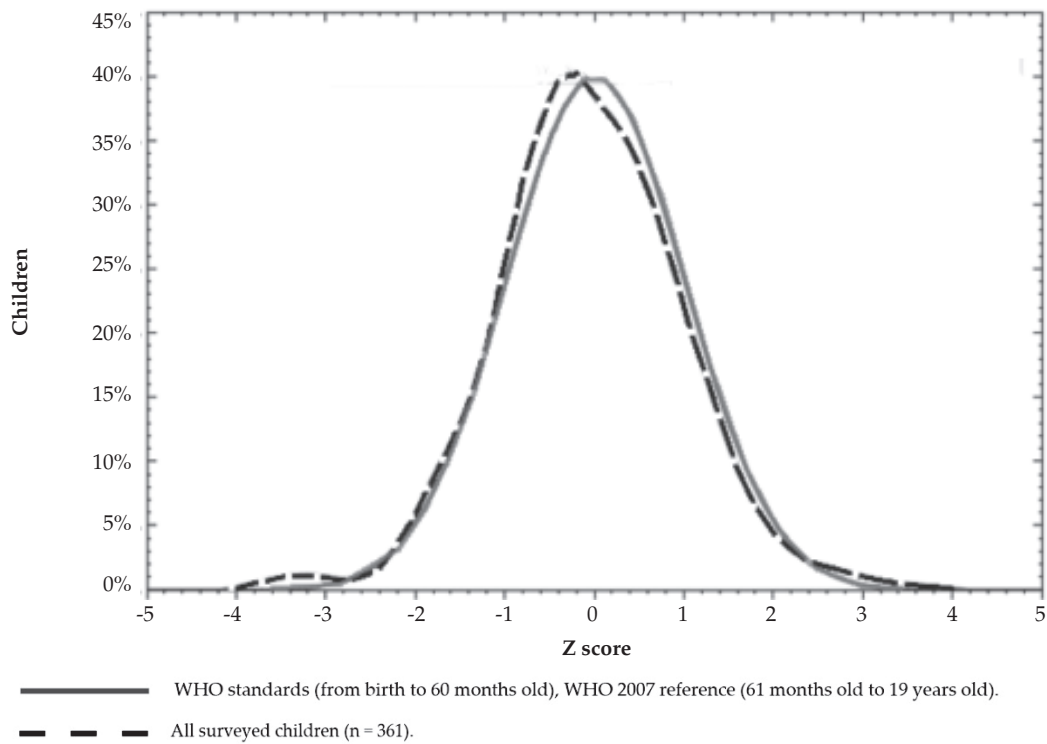
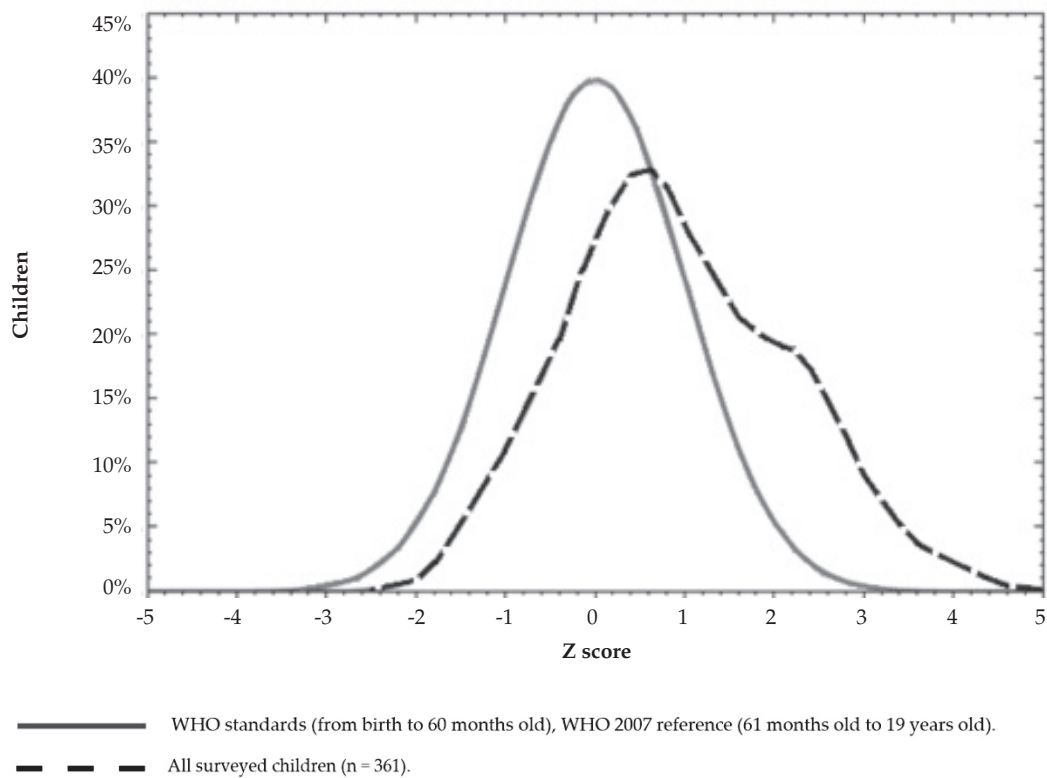


FIGURE 2. Distribution of BMI/age of students from schools No. 63 and 334 in Cutral Co and Plaza Huincul



and school and the different studied outcome measures. Similarly, no significant relationship was found when analyzing the relationship among blood pressure values and waist circumference and body mass index results.

However, when comparing BMI and height results, statistically significant differences were observed ($X^2: 25.8, p: 0.0002$); tall stature values were predominant in the overweight and obese children group (Table 2).

Qualitative stage results

the meeting was attended by 36 community members. Their characteristics are described in Table 3.

Of participating adults, 27.7% were overweight, 47.2% were obese and 57.5% had a middle or high cardiovascular risk.

Table 4 is based on participants' opinions and describes the possible causes of obesity and the alleged responsibility assigned to each cause according to the group participants' feedback.

Although there were no differences among groups in terms of the most relevant core ideas

identified as causes of obesity, there were some differences in the perspectives given to these aspects by each group.

Children tended to hold adults responsible (they claimed: *"We need adults"*) and highlighted the monotony of foods offered at home and the lack of opportunities to do physical activity (one child complained: *"Mom comes from work and takes a nap"*). Additionally, parents referred they suffer great stress at work and feel tired when facing household chores, especially in the case of single-parent households. In relation to results showing that children had a standard stature for their age, during the meeting one of the mothers said: *"Everyone's always talking about malnutrition, but the problem here is obesity!"* which led the group to reflect on this issue, and one teacher admitted: *"We have difficulties recognizing when someone has an average weight and when someone is obese."*

Some obese adults discussed their situation and one of them, a healthcare agent, said: *"I know I'm obese and I need help. I'm a healthcare agent and I can't talk about this unless I do something. I'm going to ask my son to help me start doing physical activity and developing healthy habits."*

Except for children, the rest of the groups pointed out that violence on the streets is one of main causes for reducing opportunities for outdoor physical activity.

In relation to the differences observed in obesity in terms of sex, groups identified three reasons they believed caused this. Boys tend to spend more time in front of a screen (playing videogames or watching TV) and they consume high-calorie foods and beverages while doing it. Girls help with household chores; and given that television and commercials propose a model of social success in relation to thin women, parents tend to exercise more control on their daughters to prevent them from gaining weight.

DISCUSSION

Here we describe the nutritional status and blood pressure of a population of children aged 6 to 15 years old in a highly vulnerable position, together with the analysis by the educational community on the assessment results.

A higher prevalence of overweight and obesity and a taller than expected stature was observed when compared to national surveys on similar populations.^{1,2,22-24}

Unlike the research quoted in the references, our study showed gender differences in terms of obesity distribution, with a higher prevalence

TABLE 2. Relation between body mass index and stature results in male and female children from schools No. 63 and 334 in Cutral Co and Plaza Huincul, n: 361

Body mass index	Short stature	Standard stature	Tall stature
Normal	8 (3.9%)	197 (95.6%)	1 (0.5%)
Overweight	0 (0%)	73 (97.3%)	2 (2.7%)
Obesity	0 (0%)	58 (93.5%)	4 (6.5%)
Severe obesity	0 (0%)	15 (83.3%)	3 (16.7%)

TABLE 3. Personal characteristics of participants of nutritional status focus groups regarding male and female children from schools No. 63 and 334 in Cutral Co and Plaza Huincul, n: 36

	n	%
Age		
Children	9	25,0
Adults	27	75,0
Sex		
Male	9	25,0
Female	27	75,0
Role		
Students	9	25,0
Mothers-fathers	8	22,2
Teachers	8	22,2
Healthcare agents	11	30,5

in boys. The prevalence of hypertension was similar to that found in the study by Zeberio N., et al.²⁵. However, no significant relationship was observed in our sample between hypertension and central obesity, although the more obese children were taller, an association pointed out by several authors, and related to the type of diet of preschool children.²⁶

Although the studied population lives in a vulnerable setting, the prevalence of low weight and short stature was smaller than that reported in the province of Neuquén in 2004.² Such findings are probably related to certain strategies implemented by families to mitigate the effects of poverty, which have been described in previous local studies.^{27,28}

TABLE 4. Causes and sub-causes of obesity in students from schools No. 63 and 334 in Cutral Co and Plaza Huincul, classified according to the beliefs of each social actor in the educational community

Social actor	Causes	Sub-causes
Students (both sexes)	<p>Preference for high-calorie foods and beverages (flour, candy, soft drinks).</p> <p>The more obese children are, the less physical activity they do and more high-calorie foods they consume.</p> <p>Low level of physical activity in children</p>	<p>The food industry designs foods and its commercials in order to promote consumption in the population.</p> <p>Low self-esteem due to obesity.</p> <p>Bullying against obese children.</p> <p>Many hours of sedentary lifestyle in front of a screen (TV, cell-phone, computers, etc.).</p> <p>Adults find it difficult to take their children to the park or do activities with them outdoors because they are tired after work or face limitations because of their single-parent family structure and have a small social support network.</p>
Mothers and fathers	<p>Little variation ("monotony") in the foods offered at home.</p> <p>Prefer to select and prepare foods with a high fat and carbohydrate content.</p> <p>Low level of physical activity in the family.</p>	<p>Adults are tired after work.</p> <p>Little variety at the time of selecting and preparing foods.</p> <p>Little variety when selecting and preparing foods.</p> <p>Belief that children are at a "nutritional risk."</p> <p>Lack of time in working adults.</p> <p>Apathy.</p> <p>Unawareness of their own health status.</p>
Teachers	<p>Snacks offered contain flour and sugar.</p> <p>The school candy stand offers products that contain flour and sugar.</p> <p>Missing school too often, therefore, less stimuli to do physical activity.</p>	<p>The State probably assumes that the student population is at a nutritional and malnutrition risk.</p> <p>Need for additional economic resources for certain school expenses.</p> <p>Violence in the neighborhood, which forces to close the school.</p>
Local community	<p>Little use of the activities offered by different institutions and groups in relation to physical activity.</p>	<p>Violence in the neighborhood is a hurdle to the continuity of such activities.</p> <p>Families are probably unaware of the possibilities offered in their neighborhoods in relation to physical activity.</p>
Local healthcare agents	<p>Probably, a stronger focus on detecting and following-up malnourished children or children at a nutritional risk instead of obese children.</p>	

Source: focus groups with representatives of the educational community from both schools.

The members of the educational community provided their opinions on the results and identified the different causes of childhood obesity. In addition, participating adults agreed on pointing out that, before knowing the results, they believed that malnutrition was more relevant than obesity. This is probably because health care teams are "conceptually focused on detecting malnutrition."²⁹ During focus group discussions, children were identified as possible community health promoters and participants reflected on how sex-differentiated upbringing may be the cause of the higher prevalence of obesity in boys.

When it comes to establishing the causes, families agree with those described by different medical publications quoted in this discussion section, in addition to other specific causes related to their living conditions, i.e., a violent neighborhood, and how household members relate to one another. This shows that people have a prior knowledge that should not be underestimated if a primary care strategy is to be planned.

For this reason, we agree with other authors^{21,30,31} in that, when it comes to the nutritional status of children, two approaches need to be complemented: an individual health care approach (when medical knowledge takes precedence over other types of knowledge) and a collective approach (when the structure is based on the community and knowledge is horizontal).³²

Since the sample was purposively selected, results are only representative of the reality at the schools included in the study and cannot be extrapolated to a wider population. However, researchers' objective in this study was not to obtain general results, but to focus on the community's problems and generate knowledge for local participatory actions. Results call for a future assessment with a sample representative of the general population and broader research on the context of upbringing that would allow to better understand the health/illness/care process in this community.

CONCLUSIONS

It was possible to establish the nutritional status and the presence of metabolic syndrome indicators in the students of selected schools, and a high prevalence of obesity has been observed.

The educational community pointed out the causes of the problems detected and focused on the items to be taken into account for a collective health care intervention. ■

Acknowledgments

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Annex 1

Cardiovascular risk factors form

Formulario de Empadronamiento		Nº	FEAPSenRed REMEDIAR
CAPS DE REFERENCIA	CODIGO	FECHA EMP.	/ /
APELLIDO	NOMBRE	TIPO DE DOC.	NRO.
FECHA DE NACIMIENTO	EDAD-AÑOS	SEXO	OBRA SOCIAL
		MUTUAL	PREPAGA
			NINGUNA
TEL.	PROV.	HECTO.	MUNICIPIO
LOC.	CALLE/RUTA	NRO./KM	URBANO
			RURAL
			BARRIO
MZA.	EDIFICIO	PISO	CASA-DEPTO
			CAMINO
			CAMPO
			LOTE
			PARCELA
FACTORES DE RIESGO			PUNTAJE
1 Sexo y edad	Masculino	45 años o menos	0
		Mayor de 45 años	1
	Femenino	55 años o menos	0
		Mayor de 55 años	1
HTA			
2 En los últimos 2 años, ¿lo tomaron la presión arterial? (sólo para mayores de 20 años)	Si	0	
	No	1	
3 ¿Cuántas veces un médico, una enfermera u otro profesional de la salud le dijo que tenía la presión alta?	Ninguna	0	
	1 vez	1	
	2 o + veces	4	
COLESTEROL			
4 En los últimos 5 años, ¿le han medido el colesterol? (sólo para mayores de 20 años)	Si	0	
	No	1	
5 ¿Alguna vez un médico, una enfermera u otro profesional de la salud le dijo que tenía el colesterol alto?	Si	2	
	No	0	
DMT2			
6 En los últimos 3 años, ¿le midieron glucemia/azúcar en sangre? (sólo para mayores de 40 años)	Si	0	
	No	1	
7 ¿Alguna vez un doctor, una enfermera u otro profesional de la salud le dijo que tenía diabetes o azúcar alta en la sangre?	Si	6	
	No	0	
ECV			
8 ¿Ud. o algún familiar directo (padre, madre) tuvo un infarto, ACV (ataque cerebral) o problema cardíaco?	Ud.	6	
	Familiar directo	1	
	No	0	
TABACO			
9 ¿Ud. fumó al menos un cigarrillo en los últimos 30 días?	Si	2	
	No	0	
SUMATORIA			
NIVEL DE RIESGO	Nº DE FACTORES DE RIESGO (sumatoria)	COMENTARIO	FIRMA DE LA PERSONA EMPADRONADA
Alto	7 o más	Debe tener una consulta en el centro de salud	
Moderado	4 - 6	Debe tener una consulta en el centro de salud	
Bajo	0 - 3	Debe ser tenido en cuenta para actividades de promoción y prevención	
Lugar	Fecha	Sumatoria Obtenida	
Nombre del agente		Concurrió al CAPS	
Nombre de la persona empadronada		Ubicado en	
		Los días	en el horario
Nº	FEAPSenRed REMEDIAR		