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Double Burden of Malnutrition in Caldas and an Approach to its Social Determinants

Nancy Paola Murcia-Moreno and Valentina Cortés-Osorio*

National University of Colombia - Headquarters Bogotá - Faculty of Medicine - Department of Nutrition - Bogotá, D.C. – Colombia

***Corresponding Author:** Valentina Cortés-Osorio, National University of Colombia - Headquarters Bogotá - Faculty of Medicine - Department of Nutrition - Bogotá, D.C. – Colombia.

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Summary

Introduction: The social problems that arise from the Double Burden of Malnutrition have been recently recognized. Nevertheless, studies carried out in Bogotá D.C. and the municipality Tumaco stand out.

Objective: To identify and analyze both the general population and the individual double burden of malnutrition in Caldas from the *Diagnóstico Nutricional de Caldas* 2014 (Spanish for Caldas Nutritional Diagnosis, 2014) in order to make an approach to its main social determinants in the municipality of Aguadas, Caldas.

Materials and Methods: A descriptive, analytical and cross cutting study developed in two phases. During the first phase the *Diagnóstico Nutricional de Caldas* 2014 data bases were analysed to identify both the general population and the individual Double Burden of Malnutrition, considering the variables sex and age. The second phase consisted of the design, the implementation and the analysis of an interview in seven similar cases in order to make an approach to the double burden of malnutrition social determinants in Aguadas, Caldas.

Results: General population double burden of malnutrition is evident in all the groups that were assessed; besides there is but low prevalence of individual double burden of malnutrition. The main determinants of the double burden of malnutrition in Agendas are socioeconomic, gestational and nutritional.

Conclusion. General population double burden of malnutrition is present in Caldas, with children under 18 years being the group with the highest prevalence values. No significant differences in terms of sex were observed. It is fundamental to identify the main double burden of malnutrition social determinants to have an impact in the problematic foundations.

Keywords: *Social Determinants of Health; Overweight; Obesity; Malnutrition (MeSH)*

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Introduction [T1]

There are different definitions of the double nutritional burden (DCN), which according to Shrimpton & Rokx [1] can be evidenced in three levels: individual, household and population. Within the former, the coexistence of excess weight and iron deficiency is the most common situation, as well as excess weight along with short stature; the second refers to the coexistence of delay in height in children and overweight or obesity of the mother; finally, the population DCN is the presence of malnutrition and excess weight in the same population.

For this research, a definition of DCN was elaborated that included the possible perspectives: coexistence of malnutrition by excess and deficit, including deficiencies of micronutrients that occur in the same individual, household or population - given the characteristics of the secondary information obtained, it was only possible to analyse the DCN at a population and individual level.

At present, there is even talk of a triple nutritional burden, understood as the situation where a child under five years of age has a delay in height, his mother is overweight or obese, and either anaemia [2].

In this research, the patterns for the adult population are used for definitions that include indicators of anthropometric type [3], growth patterns for children under 18 years [4] and Atalah's nutritional assessment pattern for pregnant women, all endorsed by the World Health Organization (WHO) [5].

Research has been carried out to recognize the national situation of the DCN at all levels. Atalah [6] indicates that the DCN affects all age groups and highlights those under 17, who present chronic malnutrition in 14.4% and overweight in 16.8%.

On the other hand, Garret & Ruel [7] found that in Colombia about 6% of the DCN in the mother-child duo is in rural areas, while 4.5% in urban areas.

Other studies analyse the situation at departmental level: on the one hand, according to Cadena [10], Vaupés (30.9%), Amazonas (26.9%), Guainía (22.4%), La Guajira (20.9%) and Vichada (19.1%) present higher proportion of DCN in households; while Benjumea M.V reported that in Antioquia, 12% of households have global duality of malnutrition and 5.6% partial duality. The global duality is explained as those households where all children under 19 are underweight and all adults are in excess, while in partial duality at least one child and one adult must be in that situation [8].

In Nariño, three reports on DCN were found: in the first, 14.5% of households had DCNP [9], the second reported a prevalence of 18.5% [10] and the third indicated that in five out of eight households the mother had excess weight and some or all of the minor nutritional deficits [11], the last two studies addressed the analysis at the family level.

The study carried out by the Observatory of Food and Nutrition Security OSAN [2] showed the situation of national DCN, finding, on the one hand, 8.18% of households where at least one child has a delay in size and at least one adult is in excess of weight and, on the other, 5.5% of households where a child under five years of age has a delay in height and his mother is in excess. This panorama allows to visualize that the DCN is a complex problem, with gaps of information and knowledge to be solved.

The social determinants of the double nutritional burden are diverse and specific; For the present investigation, the classification of causal factors described by Shrimpton & Rokx [1], which is composed of four groups, was taken as a reference and fed with the set of determinants found for DCN:

Biological and health: The starting point is the individual, the burden of his disease and its genetic and metabolic characteristics; the influence of the health system is also included.

Economic and food: Factors that determine availability, quality, economic access and food consumption.

Sociocultural environment: Characteristics that influence the living conditions of populations, specifically in eating patterns and physical activity.

Physical and built environment: Characteristics of the physical environment that directly influence the levels of physical activity of the population.

The previous categorization can be configured as a conceptual basis for the analysis of this problem in different situations, since the dynamics of each population differ and, therefore, must be studied in a specific way. In Colombia, a set of determinants was identified at the household level: being indigenous, belonging to the lowest quintile of the wealth index, suffering from poor health conditions, having more than a child, perform poor care practices, usually consume junk food and belong to food support programs [2].

The objective of the present investigation was to identify and analyse the situation of population and individual DCN in Caldas from the Nutritional Diagnosis of Caldas 2014 and to make an approximation to the main social determinants in the municipality of Agendas.

Materials and Methods [T1]

Descriptive and analytical cross-sectional study of a retrospective type carried out in two stages:

Analysis of the databases of Caldas Nutritional Diagnosis 2014 [T2]

The Nutritional Diagnosis of Caldas 2014 was the basis for the analysis of the situation of population and individual DCN in Caldas. At the population level, the percentage of the population that presented malnutrition due to excess and deficit was calculated according to the indicators presented in Table 1 [12].

Group population	Nutritional status evaluated			
	Excess		Deficit	
	Indicator	Cut point	Indicator	Cut point
<5 years	BMI for	σ>1	49/5000	σ<-2
	age		Low weight for size	
			Low size for	
			BMI for	
5-18 years	BMI for	σ>1	age	σ<-1
	age		Low size for	σ<-2
			age	
>18 years	BMI for	σ >1		σ<-1
			BMI for	
	age		age	
	BMI for	Overweight u	BMI for	Enflaquecida
Pregnant women	age		age	
		obesity*		(underweight)
	gestational		gestational	

Table 1: *Anthropometric indicators used to identify deficit and excess situation in all population groups.*

BMI: Body mass index; σ: Standard deviation.

* Classification given by nutritional assessment patterns for pregnant women by Atalah [5]

Source: Elaboration based on [3,4] and Atalah., *et al*. [5]

Additionally, the age and sex variables were taken into account to determine the prevalence by age groups and in pregnant women. At the individual level, the percentage of the population under 5 years of age and from 5 to 18 years of age who presented excess weight by BMI and the delay in height was calculated.

Design, application and analysis of an instrument to approach the social determinants of the double nutritional burden in Aguadas, Caldas [T2]

A structured survey was developed with 43 open questions and closed organized into eight components - general information, family information, observations, aspects of the home, mother-child, food, economic and other aspects- in order to obtain information on the main social determinants of the DCN.

The DCN in adults between 18 and 64 years old did not have a higher prevalence than in the other population groups; Although the two extremes of malnutrition were present, the deficit presented a prevalence of 2.2% and the excess of 53.6% (Figure 1), which allows us to identify that the main problem in adults is excess weight and not DCN. This trend is similar to that presented by the National Nutrition Situation Survey ENSIN 2010 for Colombia (15).

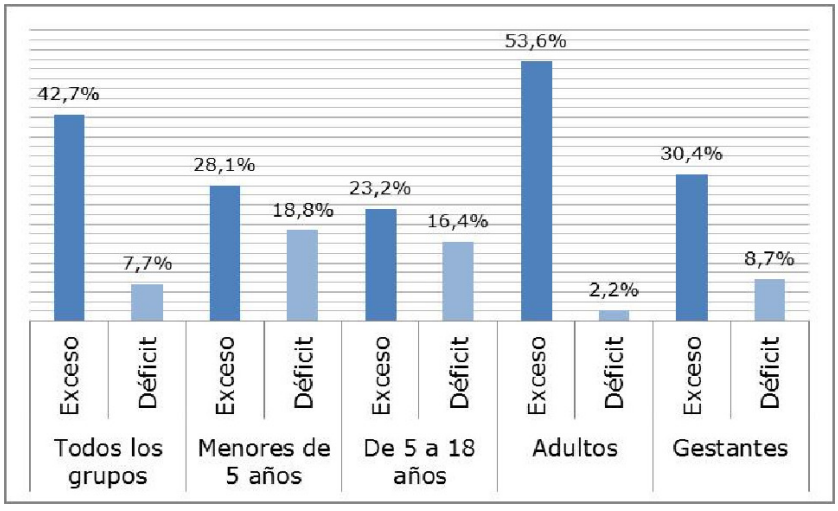

Figure 1: *Prevalence of double nutritional population load by age groups and in pregnant women.*

Source: Elaboration of the authors, based on data from the Caldas Nutritional Diagnosis 2014 [12]

Finally, DCNP was evident in the case of pregnant women, with excess weight being the one with the highest prevalence compared to the deficit situation, whose difference is 21.7%.

Taking into account the sex variable, DCN was presented in men and women, being the most affected by the excess of weight when the men exceeded 10.3%, but in the latter there was a greater malnutrition situation due to deficit with 3.1% of difference; this behaviour of the data was maintained for groups of 5 to 18 years and from 18 to 64 years old. Despite the differences, the problem with the highest prevalence is excess weight in both sexes.

The characteristics of the DCNP differed in children under five years of age compared to the other groups, since excess weight was higher in boys than in girls with values of 29.8% and 26.5%, respectively; Similarly, the deficit of girls presented higher values with respect to children, 18.7% and 18.1% respectively (Figure 2).

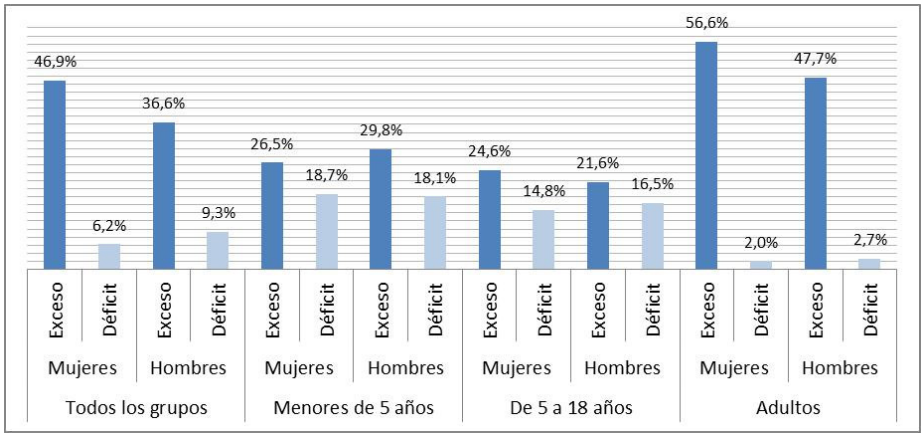

Figure 2: *Prevalence of double nutritional population load by age and sex groups.*

Source: Elaboration of the authors, based on data from the Caldas Nutritional Diagnosis 2014 [12]

The DCNI is the presence of two extreme states of malnutrition in the same individual [1]. In the present investigation it was found that the prevalence was low in the analyzed age groups, since in the children under five years a value of 6% was found and in the group of 5 to 18 years of age it was 3% (Figure 3).

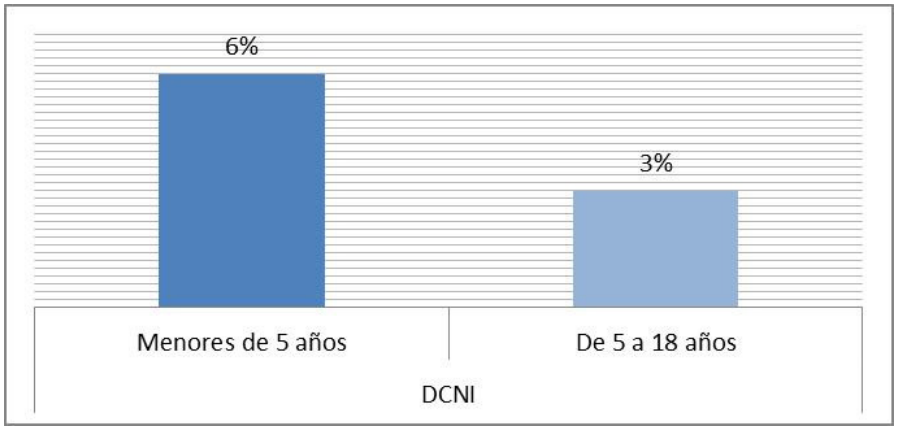

Figure 3: *Prevalence of double individual nutritional burden in children under 5 and 5 to 18 years*

Source: Elaboration of the authors, based on data from the Caldas Nutritional Diagnosis 2014 [12]

Taking into account the sex variable, it was identified that the prevalence of NICU is higher in females for both population groups and increases with age for girls, since in under 5 years it was 53% and went to 68% in the group of 5 to 18 years; in children, the behaviour is opposite, since 47% presented in children under 5 years of age and decreased to 32% from 5 to 18 years (Figure 4).

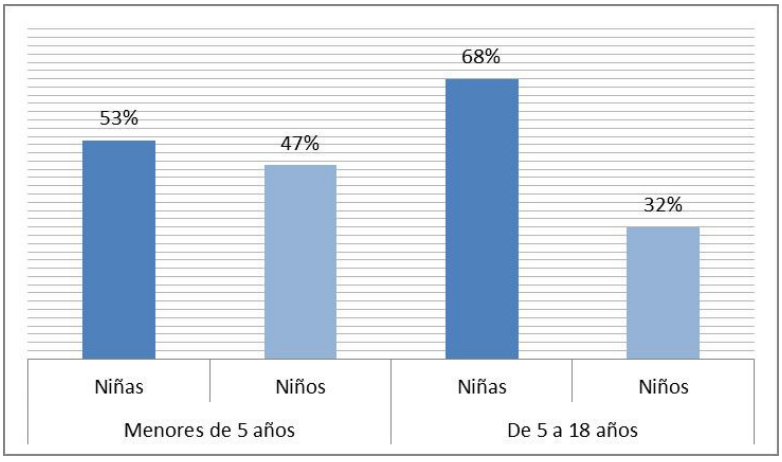

Figure 4: *Prevalence of double individual nutritional burden in children under 5 and 5 to 18 years old by sex.*

Source: Elaboration of the authors, based on data from the Caldas Nutritional Diagnosis 2014 [12]

Approach to the analysis of the social determinants of the double nutritional burden in Aguadas [T2]

The situations that were presented in more than four cases of the total evaluated were identified as determinants. The determinants found are shown below:

	Determinants	Result
Biological and of health	Excess weight of the mother during pregnancy	5 out of 7 cases
	Complications such as preeclampsia, pica, urinary tract infection and low weight	5 of 7 cases
	High birth weight	4 of 7 cases with more than 3500g
	Determinants	**Result**
	Physical inactivity of the mother	5 of 7 cases
	Excess current weight of the mother	4 of 7 cases
Economical and food	Low socioeconomic status	5 of 7 cases
	Tenancy of the house for rent	5 of 7 cases
	Insufficient income for household expenses	4 of 7 cases
	Inadequate practice of breastfeeding	7 of 7 cases
	Inadequate feeding practice complementary	5 of 7 cases
	Inadequate eating habits	5 of 7 cases
	High consumption of fast foods	6 of 7 cases
Ambient sociocultural	Overcrowding	4 of 7 cases
	Inadequate perception of body weight of the boy or girl by the mother	5 of 7 cases

Table 2: *Determinants of the double individual nutritional burden in Aguadas.*

Source: Elaboration of the authors, with their own information.

Discussion [T1]

Double population nutritional burden [T2]

The information obtained allowed to have an initial panorama of the problem, whose tendency is maintained for all the population groups; however, it is necessary to analyses it in each of them, since this differentiation allows having a complete notion that accounts for its possible causes and consequences.

The assessment of the deficit in children under 5 years included diagnoses of low weight for height and low height for age, which, according to the ethology of these problems, indicates that it is a serious situation of chronic origin, since in a short time of life, and of great importance for the human life cycle, situations of Malnutrition that are avoidable [8,13]

In the population of 5 to 18 years, despite the decrease in the deficit figures, the situation remains problematic, since the prevalence of the delay in size continues with higher values compared to the acute deficit, which indicates that this The type of malnutrition is starting at an early age and is being maintained over the years, perhaps because the actions are not aimed at solving their basic determinants.

It is possible to think that the decrease in the PNNP figures in the group of children under 5 years of age is due to the fact that there are more social determinants such as: malnutrition of the mother, prenatal diseases, low birth weight, inadequate practice of breastfeeding and belong to a food support program [2], which are mostly directed to this population.

The lower tendency to nutritional deficit that occurs in adults can be a consequence of the fact that the deficit is only evaluated by the body mass index, since the size/age indicator is not a modifiable value in this group and therefore does not allow recognize nutritional alterations. However, it could be thought that low values would reflect nutritional alterations that began at an early age [8] and were maintained until adulthood.

The situation of malnutrition in adults tends to excess weight and even exceeds the other population groups by more than 10%. This opposite tendency between the values of excess and deficit makes the DCNP in adults not very prevalent, however, this view only includes anthropometric parameters. What would happen if other variables such as biochemical indicators were evaluated? It is possible that the prevalence of double nutritional burden and even triple nutritional burden will increase, since they would include indicators that account for another type of malnutrition, such as anaemia [15].

With regard to the group of pregnant women, approximately 40% of those evaluated were in a situation of malnutrition, which is worrisome since from this stage the nutritional and health status of the populations begins to be determined [8]. In this sense, malnutrition in pregnancy can be a determinant for DCNP in children under 18 years of Caldas.

On the other hand, with regard to sex, it was found that the behaviour is equal to the national data for all age groups, since the population over five years of age is more overweight than the male sex and in the latter the deficit is greater; for its part, in the under-fives the trend is opposite.

It can be thought that the role of women in food could be part of the explanation of the situation of DCNP by sex, since it was identified a trend of this problem from ages where its role in food issues begins to be shaped by cultural patterns [1]. To identify the causes of this behaviour, it is necessary to carry out in-depth studies that include the gender issue.

Double Individual Nutritional Load [T2]

Although the values found are low, they should not be underestimated because they are evidence of a serious situation of malnutrition that may have implications not only at an individual level but also at a population level, in a short and long term, since some

authors have indicated that the DCNI is the most severe expression of this problem when presenting extreme states of malnutrition in the same individual [7].

It is possible that this problem is much greater, since the available data allowed for the analysis taking into account only one perspective of the DCNI that includes delay in height and overweight; the prevalence of NICU could increase in the department if biochemical indicators, other population groups and municipal representativeness were considered [15].

Ultimately, the analysis of DCN at the family level should not be forgotten, since a high prevalence of malnutrition was identified in all age groups; however, in order to reach a conclusion at the household level, subsequent analyses must be done since the characteristics of the information obtained did not allow it.

Twenty approach to the analysis of the social determinants of the double nutritional burden in the municipality of Aguadas [T2]

The results found according to the classification of causal factors described by Shrimpton & Rokx [1] are described below:

Biological and health: The set of determinants identified in this group -aspects of gestational type, others specific to the individual and specific to the mother- are important due to the intergenerational transmission of malnutrition, since the state of health and nutrition of the pregnant woman influences later ages. It highlights the inadequate nutritional status of the mother in pregnancy and currently, physical inactivity and inadequate eating habits.

Belonging to an ethnic group, the age of the mother, the prevalence of acute and chronic diseases and the source of water supply are not identified as determinants due to the non-presence or variability of the information, however, some of them are highlight as determinants of DCN in other studies [2,1,8]

It was not possible to analyse the minor's physical activity and the type of health affiliation since the sample had the same characteristics in these aspects and therefore it was not possible to determine its relationship with the DCNI.

Economic and food: Although four households recognized insufficient income for household expenses, two of them reported that money for food is sufficient. Despite this affirmation of the as a family, nutritional quality may be affected by the limited purchase of high-cost foods that are generally sources of critical nutrients for the population, such as protein and micronutrients.

With regard to food determinants, the inadequate practice of breastfeeding is highlighted in all the cases evaluated, a worrisome situation since the minimum standard is six months in exclusive breastfeeding according to the WHO [16]; the results found are consistent with the figure of exclusive breastfeeding for Caldas, which according to the ENSIN 2010 [15] is in 1.6 months.

It was recognized that there is a high consumption of carbohydrates and fats in all households and a deficient intake of micronutrients due to the low consumption of fruits and vegetables, a situation that demonstrates inadequate dietary habits that have an impact on the nutritional status of the population.

Other aspects evaluated as mother's occupation, distribution of food in the home, responsible for the minor's diet and way of food acquisition were not identified as determinants of the DCNI, however, several authors have related them as important causes, for which, in order to reach a conclusion, requires more information about each of them [2,1].

Sociocultural environment: Overcrowding is a determinant of the DCNI, given that inadequate health conditions affect the state nutritional [1,8]. Special attention should be paid to the perception of the child's body weight by the mother or caregiver, because although the children were overweight and short for age, the mothers reported that the children had adequate nutritional status, which It can have an important impact on the dietary and physical activity habits that are encouraged daily.

The area of residence was not possible to evaluate as a determinant since the whole sample lived in the urban area. With respect to this, it is necessary to obtain more information, because although the urban area may have an impact on the lifestyle of the population, several authors refer that the rural area is a major determinant of DCN [8,7].

The educational level of the mother, the displacement and environmental impact, the construction material of the home, the belonging to a community organization and the interpersonal relationship with the feeding of the child with the mother or caregiver were not recognized as determinants; however, this last information is subjective since direct observation is needed to identify this aspect.

Physical and built environment: it was not possible to identify them, since they are determinants of the environment and the methodology of the study did not allow it.

Although this analysis is an approximation to the determinants from seven family cases, it can be considered as an initial look at the causes of DCN in Aguadas.

Conclusions [T1]

The population's double nutritional burden is present in Caldas, and its characteristics vary according to the population group evaluated: in adults, there is a lower NCPD with respect to other age groups and pregnant women.

The tendency of DCNP is similar in both sexes, being malnutrition by excess more prevalent in the female sex. The prevalence of DCNI is low in Caldas, however it is possible that by including other indicators of a biochemical type it is increasing.

The main determinants of DCN in Aguadas were: low socioeconomic conditions, inadequate practice of breastfeeding and complementary feeding, inadequate eating habits, complications during pregnancy, current excess weight in the mother and inadequate perception of body weight.

It is essential to identify the social determinants of the DCN in a specific way in order to generate strategies that allow influencing the basis of the problem.

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