162 - ENVIRONMENT AND CHILDHOOD OBESITY: EPIDEMIOLOGICAL INDICATORS IN DIFFERENT CONTEXTS

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INTRODUCTION

The obesity is a chronic degenerative disease characterized by the excessive accumulation of body fat and affect health negatively (WHO, 1995), and both genetic and environmental factors are cited as the main causes. Genetics is important in determining the total body mass however the environment has increasingly been identified as crucial to the rising prevalence of obesity worldwide.(BURROWS et al 1989; ROCOL et al; 2000).

The prevalence of obesity has never reached levels as high as today, becoming the leading cause of morbidity and mortality in adult populations worldwide. (POPKIN, 2001; BATISTA FILHO et al 2007; MIGLIOLI & SANTOS 2007) The projection for 2020 is that about 30% of the global burden will be allocated to non-communicable chronic diseases mainly related to lifestyle. (WHO, 2002)

The numerous morphological and functional changes are associated with excess weight in body. His long-term outcomes trigger a series of diseases, including diabetes mellitus, hypertension, hyper-colesterolemina, hyperlipidemia, cardiovascular disease and some cancers (WILLIANS et al, 1992; MONDINI et al, 2007). In addition, there has been an increase in prevalence of overweight and obesity, consequently, the associated diseases in childhood adolescence (Barlassina et al 2002; Kuschnir et al, 2007), increasing the risk of obesity in other phases of life. (LAMOUNIER & PARIZZI 2007).

Thus, international studies show that at least 10% of children of school age worldwide are overweight or obese. North America leads the top of the list with 32% followed by Europe with 20% and the Middle East with 16% (Lobstein et al, 2004). Currently 17.1% of children and adolescents in the U.S. are overweight or obese, about three times more than 30 years ago (OGDEN et al, 2006). Undoubtedly another factor that has contributed to the increasing prevalence of obesity is the nutrition transition, and refined foods, animal and higher amounts of fat are driving the current worldwide epidemic. (POPKIN, 2001)

Indeed, it has been common practice to identify the prevalence of the obesity epidemic in both developed and developing countries, pointing to alarming, especially with regard to morbidity and mortality. (WHO, 2000)

In this context, published studies show different approaches regarding factors that predispose individuals to obesity. Among them we mention the environmental factors most common: high intake of foods with high caloric density (Strich& GIUGLIANO, 2005), low levels of physical activity (Frutos et al, 2003), high consumption of fast food's (Andersen et al, 1998) and risky behavior, such as excessive computer use, watching television more than two hours per day, and little participation in active leisure activities.

Given the above, the present study aimed to investigate, from a literature survey, the evidence presented in the literature regarding the role of macro and micro environment in today's epidemic of childhood obesity.

To perform this systematic review was used to works published between the years 1989 to 2008. The searches were conducted in electronic databases (Medline / PubMed, Lilacs, Ovid, Science Direct, Sportdiscus), national and international journals, and search for specific authors, and contact with researchers. Data were grouped around the following topics: overweight, obesity or excess body weight in the context World (Europe, North America, South America and Brazil). In addition to addressing the main theoretical models of obesity, the interplay of macro and micro environment in the prevalence of childhood obesity.

PREVALENCE OF OBESITY IN THE WORLD

In developed countries there has been a considerable increase in the magnitude of overweight and obesity in children and adolescents. In Canada, Australia and parts of Europe the rates of increase in excess body weight in children, in the 90% achieved a year (Lobstein et al, 2004). Specifically, high values in Italy the prevalence of childhood obesity (13.25%) were observed (CELI et al, 2003). Further details are shown in table 1. In particular, the highest growth can be observed in England and France, but it seems there is a general trend throughout Europe affecting children. This shows the inexorable growth of the problem of children, which have more methodological complexities in their measurements (IOTF, 2008).

Table 1.Increase in overweight (SB) and obesity (OB) in European children, selected countries, 1975 -2000

	Research Day	SB + OB (%)
CZECH REPUBLIC	**1991**	**10**
	2000	13
FRANCE	**1963**	**3**
	1977	6
	1990	**10**
	1995	13
	2000	**16**
GERMANY	1975	11
	1985	**12**
	1995	18
NETHERLANDS	**1980**	**10**
	1997	18
POLAND	**1994**	**8**
	2000	18
SPAIN	**1980**	**12**
	1995	19
SWITZERLAND	1965	4
	1975	**8**
UNITED KINGDOM	1974	8
	1984	**8**
	1994	17
YUGOSLAVIA	**1989**	**12**
	1998	16

Source: LOBSTEIN, FRELUT (2002), cited by LANG (2005).

PREVALENCE OF OBESITY: CENTRAL AMERICA, CARIBBEAN AND SOUTH AMERICA

In most countries of Latin America and the Caribbean there is an increasing risk for obesity and other associated problems such as metabolic syndrome and cardiovascular diseases. Together, these diseases cause thousands of deaths and damage the economy and quality of life (Jacoby, 2004).

Thus, it is emphasized that obesity constitutes a major problem of high costs that need attention and because it represents a risk factor for several chronic conditions that are of importance to public health. The major prevalence of obesity among preschool children in Latin America and the Caribbean are shown in Table 2.

Table 2.Prevalence of obesity in preschool children by Country

Countries (Year)	Obesity (%)
Central America and Caribbean	***3,6***
Costa Rica (1996)	6,2
Dominican Republic (1996)	2,8
El Salvador (1993)	2,2
Guatemala (1995)	4,0
Haiti (1994/95)	2,8
Mexico (1998)	3,7
South America	***5,1***
Argentina (1994)	7,3
Bolivia (1998)	4,9
Brazil (1996)	4,9
Chile (1996)	7,0
Colombia (1995)	2,6
Paraguay (1990)	3,9
Peru (1996)	6,4
Uruguay (1992/93)	6,3
Venezuela (1997)	3,0

Source: (JACOBY, 2004).

Thus, there is a wide variation in the prevalence of obesity among schoolchildren in several Latin American countries (PAL, 2003; KAIN et al, 2003). Although few of these data are derived from population surveys, it is noted that the highest prevalence are concentrated in Argentina (7.3%), Chile (7.0%), Bolivia (6.5%), Peru (6.4%) and Uruguay (6.2%) and Costa Rica (6.2%). According to these authors, obesity was most pronounced in girls living in urban areas and high socioeconomic strata.

PREVALENCE OF OBESITY IN BRAZIL

The change in the nutritional status of the population has been intense in recent decades. Obesity increased among children, adolescents and adults. Evidence of the simultaneous change in the high-calorie diets and low standards of energy expenditure are well documented in the literature, as well as the relationship of diet and sedentary lifestyle with chronic degenerative diseases (COITINHO, et al, 2002).

Thus, studies conducted in different regions of Brazil found prevalence of excess body weight concern in children of different ages and socioeconomic strata. This picture of excess body weight of Brazilian children varies according to region, with socioeconomic stratum and the methodology used in the study. Moreover they have been found to these problems, unlike what happened in the past, are growing mainly in the population with lower income (BATISTA FILHO, et al 2007; IBGE, 2006).

The rates of excess body weight, observed in recent studies reach alarming percentage. Table 3 shows a summary of the major studies on specific populations of Brazilian children, distributed according to the main areas investigated (DUTRA et al, 2006; SOUZA LEO, et al 2003).

The highest prevalence of childhood obesity were observed in south and southeast, it's probably a function of socioeconomic status, greater food supply and population density in these regions. On the other hand, the lowest prevalence rates were located in the northeast and Midwest, obviously because they are in adverse situation in more developed regions of Brazil.

These data should be analyzed with caution, given the methodological biases observed in the studies cited, as well as the bad distribution of income and socio-cultural diversity of Brazil, and can lead to misinterpretations due to the diversity of factors involved.

Table 3: Prevalence of overweight and obesity in the main regions of Brazil, according to the gender.

Region	Author	Year	Overweigh%		Obesity %		Total%	
			M	F	M	F	SP	OB
South	**DUTRA, et al**	**2006**	**-**	**-**	**-**	**-**	**19,3**	**4,5**
	RONQUE, et al	2005	19,7	17,3	17,5	9,3	19,0	19,0
	SOAR, et al	**2004**	**19,1**	**16,7**	**7,9**	**5,4**	**17,9**	**6,7**
Southeast	MONDINI, et al	2007	**-**	**-**	**-**	**-**	10,8	6,2
	COSTA, et al	2006	14,8	16,6	20,3	15,8	15,7	18,0
	RIBEIRO, et al	**2006**	**-**	**-**	**-**	**-**	**8,4**	**3,1**
	ANJOS, et al	2006	15,5	18,3	6,9	6,2	-	-
	RAMOS E BARROS, et al	**2003**	**8,9**	**6,2**	**3,9**	**3,3**	**7,3**	**3,5**
Midwest	GUIMARÃES, et al	2006	10,5	18,7	-	-	14,4	-
	GIUGLIANO, et al	**2004**	**16,7**	**16,9**	**4,4**	**6,0**	**16,8**	**5,3**
Northeast	SILVA, et al	2005	17,6	27,0	13,0	9,8	14,5	8,3
	OLIVEIRA, et al	**2003**	**-**	**-**	**-**	**-**	**9,3**	**4,4**
	SOUZA LEÃO, et al	2003	-	-	-	-	-	15,8

Overweight = SP, Obesity = OB.

THEORETICAL MODELS OF OBESITY

Obesity is a disease that coexists with humans for centuries. However, its prevalence increased after the industrial revolution, and today has reached epidemic proportions. May come from biological or environmental. The biological factors are influenced by age, sex, hormonal and genetic factors (MARGAREY, et al, 2001; DANADIAN, et al, 2001).

In particular, there is consensus among scholars in the field of health, the environment can drive the epidemic of obesity. Obviously, the biological factors contributing to the increased prevalence of overweight and obesity. However, the increase occurred in the last 30 years are the result of environmental change (Hill et al, 2003).

In recent decades some authors have tried to explain the factors that predispose individuals to obesity (EGGER, et al, 2003; BELL &Swinburn, 2004). In research involving students and the obesogenic environment the authors (Carter, Swinburne, 2004), metaphorically describe a vicious cycle (movement of inertia, mechanical and psychological disorders, feeding and socioeconomic status) that act as moving a throttle wheel, with inefficient brakes and that increases the obesogenic environment, represent a major challenge for weight maintenance.

For a better understanding of obesity, it may be possible to distinguish between different approaches to the main themes, the possibilities for interpretation and best solutions for each problem type (LANG &Rayner, 2005). Because of that, many authors highlighted some approach models of obesity, which has received grip on various parts of the world.

1)Genetic: the central argument that describes the human body has a genetic predisposition to obesity (GAD2 gene mutation) that occurred in our ancestors because of the lack of food (Boutin et al, 2003);

2)Transition economics: the argument of this model is that economic progress expressed by the development of post-industrial consumer society was associated with changes in lifestyle. Jobs that required physical demands are being exchanged for labor activities and sedentary leisure activities (Lang &Rayner, 2005; Dubos, 1980);

3)Convergence: this model proposes that as countries become economically advanced, its consumers tend to adopt similar tastes and preferences in taste and nutrition. This is due to globalization and mass consumption (WERTHER, 1996). Thus, it is assumed that health and profile of obese individuals become similar

4)Technological changes and supply of food, emphasizes that the rise in obesity is associated with success and failure of agriculture in the twentieth century and sourcing policies. Obesity is proposed as a policy response to unexpected increases in production that were heavily promoted by governments around the world in the second half of the century 20 (Rayner& LANG, 2005; BURNET &Aykroyd, 2005);

5)Cultural transition: focus on aggressive marketing campaign and advertising of food, which have transformed the cultural rules and norms about what to eat, where to eat and eat more.Besides pressure from the media, which promotes a change in eating patterns of family and increasing the size of the portions (Golan, 2002).This model shows the pressure on the entire population and that has changed eating patterns and urbanization (CRITSER. Fatland, 2003).

6) Psychosocial argued that the changes in what people eat are intensely personal. Although shaped by social values, types of products and prices. Increasing the number of obese people suggests that consumers do not control what they eat or where to eat.Eating becomes an indulgence to ease alienation, feelings of worthlessness, or compensation for the stress of modern life (Orbach, 2004)

7)Obesogenic environment, explains the interaction between physiology and environment. It was proposed by two Australian researchers (EGGER &Swinburn, 1997) as the genetic blueprint, they accept that humans possess physiological mechanisms to defend against the loss of body weight, but are weak to defend itself against the body weight gain when food is abundant (JAMES & JOHN, 1998). The obesity epidemic can be explained based on a conventional form as a normal physiological response to abnormal and inappropriate environment.

8)Nutritional transition: based on work done at the University of North Carolina (Popkin, 2002). Underscores that the world is experiencing the third great nutrition transition, which comes after previous epidemiological and demographic transitions, which define the type and profile of diseases that people are more likely to suffer. Inevitable consequence of capitalist consumer society and partly convergent (Popkin, 2002). With the pattern of rising income, the first people to enhance their diet, therefore, eat more than they need. The dietary transition that took more than five decades in Japan occurred in less than two decades in China (WHO, 2002).

Thus, highlighting the differences between the models above, helps explain why the obesity epidemic affects the economy financial public health. Different roles of the causes of obesity involve different strategies, solutions and vice versa.

OBESITY AND ENVIRONMENTAL FACTORS

Some authors have recently sought to study the main factors related to obesity, however, few studies have focused on the environmental implications of obesity. In particular, there are few instruments with validity and reliability, enabling us to measure the variables related to the obesogenic environment with precision (MONDINI et al, 2007; Kuschnir&Mendonca, 2007, Silva et al, 2008; ATKINSON, 2008).

Thus, the model originally proposed by obesogenic environment (EGGER &Swinburn, 1997), highlights the environmental influence on the genesis of obesity. This influence can be divided into two categories: a) macro environment - determines the prevalence of obesity in the population, and b) the micro-environment - determines the biological and environmental influences, indicating where the individual becomes obese, which can be subdivided into: physical environment, economic and socio-cultural.

The macro environment can be set to the backdrop of laws, government policies and regulations of a country or state for industrial production of consumer durables (cars and machinery) and consumer goods (food and clothing). This regulation may be primarily in relation to prices, the media, to the packaging labels, as well as taxes and incentives applied to the area of fitness, sports and engineering, such as building bike paths, hiking trails and recreational parks (EGGER &Swinburn, 1997).

This set of actions can influence the reduction of energy expenditure, whether in work, active commuting or in food consumption and has produced negative impacts on health and quality of life. Moreover, the micro-environment is represented by aspects such as: food at home, the choice of food (preferably), location of fast food restaurants (nearby), family income, size of portions, institutional feeding the family rules behavior (computer and television), the attitude of friends, media pressure and festivities, the cost of sports, etc..

Another factor that deserves attention, both in the prevention and control of obesity, is the school environment. In particular, the contribution the school has been low on the food and nutrition education students (GIUGLIANO &Strich, 2005).

Unfortunately, it is noted that both in Brazil and abroad, there is still a huge gap in the literature with regard to intervention programs in school, particularly related to the issue of healthy eating habits. It stands out a pioneer study in NZ schools (Carter &Swinburn, 2004), where the authors found that only 16.5% of schools have rules of supply and the food were the best selling snacks, soft drinks and pizza (51 %), on the other hand, the less the fruits were sold.

In fact, combinations of factors can produce a strong impact on energy balance, either positive or negative and thus contribute to maintaining healthy body weight, both in the individual and collective levels. Further details are outlined in chart 1 (EGGER &Swinburn, 1997).

	Physical Environment		Economic Environment		Socio-cultural Environment	
	Food	**Activities**	**Food**	**Activities**	**Food**	**Activities**
MACRO	Laws and food regulations Technology in food processing Foods with low fat Policy for food industry	Economy of work tasks Biking and hiking trail Policies for the fitness industry Transportation System	Fees and allowances for food Cost for food technology Marketing costs Costs	Cost of manual labor and automation Investments in parks and recreation environments Cost of oil and cars Biking trail costs	Traditional cuisine Immigrants cuisine Consumer demand Feeding Status	Attitudes to recreational National Sports Participation cultural x assistance The culture of watching x participating in sports
MICRO	Food at home Choice at school, work or cafeterias Food store Proximity to restaurants or *fast foods*	Facilities at recreation sites Two cars Safe streets Rules for watching TV and video	Family income Other family expenses Subsidies in canteens Growing food at home	Fees of Clubs or Gyms Own equipment allowance without local or events Costs in school sports	Feeding patterns of family Friend's attitude Pressure of food advertising in the media Festivities	Friend's activities Recreation in the family Attitudes of the school in sport Safety

Figure 1. Environmental effects on food intake and physical activity. (Adapted from EGGER, SWINBURN, 1997)

Thus, we see the need to create appropriate tools that can help identify the influencing factors of obesity, as well as in developing strategies that can be effective in fighting this disease. It is evident that any study that intends to broach the subject must be willing to go much further than simply detecting the prevalence, one needs to propose effective mechanisms for identifying, tracking and intervention of childhood obesity.

CONCLUSIONS

Based on what was discussed and the evidence presented, we see the importance of implementing preventive measures to combat obesity in children, adolescents and adults, particularly with regard to macro and micro environment.

The food and the food industry are adhering to new rules and start taking some positive steps, such as offering more salads in fast foods, removing trans fats from processed food, adding nutritional information to food labels. This has helped to alleviate many nutritional deficiencies of the past and indirectly helping to combat obesity.

Thus in some Brazilian states such as Rio de Janeiro, Parana and Santa Catarina, are banning the sale in school canteens of unhealthy foods such as soft drinks, snack foods, fried foods and sweets. But these actions should receive support healthy dietary practices that could begin in the home environment (Golan, 2002), and complemented the school through the school curriculum. Other areas that deserve special attention are: food industries and media.In this sense, control of advertising for unhealthy food in mass media, aimed primarily at children, as well as the inclusion of fresh food in school feeding program, or even the reduced supply of simple sugars in children's diets, are actions that can be practiced constantly (OLIVEIRA &Fisberg, 2003). Some initiatives that have been developed in Brazil are the National Curricular Parameters (PCN) program and healthy eating at school, who called for the inclusion of content on healthy eating in the school curriculum, as well as the proposal for a better quality of meals in public schools (BIZZO & LEDER, 2005)

Since changes in diet and physical activity can be influenced by parents, where few changes in caloric balance can cause substantial changes in overweight in young people (SOUZA LEO, et al 2003). Thus, identifying the main factors related to weight gain unhealthy (obese) becomes a priority in the current context.

In particular, to investigate whether obesity, one must go far beyond the mere detection of prevalence is important to identify what are the main factors that affect individuals with overweight and propose models of effective intervention, especially in children and young, before age 10 (MATSUDO, ARAÚJO, MATSUDO, Guedes, 2006).

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ENVIRONMENT AND CHILDHOOD OBESITY: EPIDEMIOLOGICAL B INDICATORS IN DIFFERENT CONTEXTS

ABSTRACT:

The obesity it's a degenerative chronic disease characterized by the excessive body fat mass and is associated with genetics and environmental factors. The aim of the study is to investigate the evidences presented in the literature about the role of the macro and micro environments in the obesity epidemic's actual context. For doing this review, published articles from 1989 to 2008 were studied, using electronic databases, national and international publications, which ones were talking about the following themes: overweight and obesity, and inter-relation between the macro and micro environment and childhood obesity prevalence. Confronting the evidences, to investigate the obesity it's necessary to go beyond the simple detection of prevalences. It's necessary to identify which are the principal factors that affect the obese subjects and propose some intervention models, especially in children and young people, before 10 years of age.

KEY-WORDS: obesity, environment, childhood nutrition disorder.

ENVIRONNEMENT ET OBÉSITÉ DE L'ENFANCE: ÉPIDÉMIOLOGIQUE INDICATEURS DANS LES CONTEXTES DIFFÉRENTS

RÉSUMÉ

L'obésité c'est une maladie chronique dégénérative caractérisée par le corps excessif grosse masse et est associé avec la génétique et les facteurs de l'environnement. Le but de l'étude est enquêter sur les signes présenté dans la littérature au sujet du rôle du macro et environnements du micro dans le contexte réel de l'épidémie de l'obésité. Pour faire cette révision, les articles publiés de 1989 à 2008 ont été étudiés, en utilisant bases de données électroniques, national et publications internationales que ceux parlaient des thèmes suivants: trop gros et obésité, et enterre la relation entre le macro et environnement du micro et prédominance de l'obésité de l'enfance. Affronter les signes, enquêter sur l'obésité c'est nécessaire à aller au-delà la découverte simple de prédominances. C'est nécessaire d'identifier lesquels sont les principaux facteurs qui affectent les sujets obèses et proposent quelque intervention modèle, surtout dans les enfants et les jeunes gens, avant 10 années d'âge.

MOTS-CLEF: obésité, environnement, désordre de la nutrition de l'enfance.

EL AMBIENTE Y OBESIDAD DE NIÑEZ: EPIDEMIOLÓGICO LOS INDICADORES EN LOS CONTEXTOS DIFERENTES

RESUMEN

El lo abstracto: La obesidad es una enfermedad crónica degenerativa caracterizada por la masa de grasa de cuerpo excesiva y es asociado con las genéticas y los factores medioambientales. El objetivo del estudio es investigar las evidencias presentadas en la literatura sobre el papel del macro y ambientes del micro en el contexto real de la epidemia de obesidad. Por hacer esta revisión, se estudiaron artículos publicados de 1989 a 2008, mientras usando bases de datos electrónicas, nacional y publicaciones internacionales, cuáles estaban hablando sobre los temas siguientes: el sobrepeso y obesidad, y enterrar-relación entre el macro y ambiente del micro y predominio de obesidad de niñez. Confrontando las evidencias, para investigar la obesidad es necesario ir más allá del descubrimiento simple de predominios. Es necesario identificar qué es los factores principales que afectan los asuntos obesos y proponen alguna intervención planea, sobre todo en los niños y las personas jóvenes, antes de 10 años de edad.

PALABRAS CLAVES: la obesidad, el ambiente, el desorden de nutrición de niñez.

AMBIENTE E OBESIDADE INFANTIL: INDICADORES EPIDEMIOLÓGICOS EM DIFERENTES CONTEXTOS

RESUMO:

A obesidade é uma doença crônica degenerativa caracterizada pelo acúmulo excessivo de gordura corporal e sua gênese está associada aos fatores genéticos e ambientais. O presente estudo objetivou investigar as evidências apresentadas na literatura a respeito do papel do macro e micro ambientes no atual contexto da epidemia da obesidade infantil. Para realizar a presente revisão, recorreu-se a trabalhos publicados entre os anos de 1989 a 2008, utilizando-se das principais bases de dados eletrônicos, periódicos nacionais e internacionais, sendo abordados os seguintes temas: sobrepeso e obesidade, e a inter-relação do macro e micro ambiente na prevalência da obesidade infantil. Diante das evidências, para se investigar a obesidade deve-se ir muito além do que a simples detecção de prevalências. É necessário identificar quais são os principais fatores que afetam os indivíduos obesos e propor modelos de intervenção efetivos, principalmente em crianças e jovens, antes dos 10 anos de idade.

PALAVRAS-CHAVE: obesidade, meio ambiente, transtornos da nutrição infantil.