

Considerations on family dynamics and the malnutrition syndrome in Mexican children

Edgar Manuel Vásquez-Garibay^{1,2*}, José Luis González-Rico¹, Enrique Romero-Velarde^{1,2},
Eva Sánchez-Talamantes², María Eugenia Navarro-Lozano² and Francisco Nápoles-Rodríguez²

¹Human Nutrition Institute, Universidad de Guadalajara; ²Hospital Civil de Guadalajara Dr. Juan I. Menchaca, Guadalajara, Jal., México

Abstract

Since the early 1990s we noted that family dysfunction was more common in children with severe primary malnutrition than in children admitted to the hospital without malnutrition. Defects on feeding habits during the first year of life, especially early weaning and inadequate complementary feeding were more common in dysfunctional families. We also observed that chronic malnutrition in preschool children, and overweight and obesity in schoolchildren were more common in children from dysfunctional families. Once the association between dysfunctional family dynamics and obesity in schoolchildren was demonstrated, it was observed that low education of fathers and mothers increased twofold the possibility of family dysfunction: OR: 2.06; 95% CI: 1.37-3.10 and OR: 2.47; 95% CI: 1.57-3.89, respectively. In addition, the low-income and the lower purchasing power of foods were associated to family dysfunction ($p < 0.05$). A remaining task is to explore how to assess family dysfunction in composite, extended, single-parent families where there exist other persons vulnerable to the different entities of malnutrition syndrome and indeed depend on adults for their care, food and nutrition. (Gac Med Mex. 2015;151:732-41)

Corresponding author: Edgar M. Vásquez Garibay, vasquez.garibay@gmail.com

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Introduction

We consider the family to be the central axis of a society and that its dynamics largely influence on the development, health, nutrition and disease of each one of its members. The nuclear family would be considered the ideal type to achieve ideal growth and development of the human being during its formative stages until the attainment of biological, psychological, affective and intellectual maturity. The purpose of this review is to show our experiences on the association between the primary cause malnutrition syndrome and nuclear families' dynamical dysfunction.

Family

The historical origin of family goes back to the very origin of primitive man. Families have been present in different societies and at all ages, influenced by the ways and lifestyles of each era. It is possible to know about a country or society with the study on how the family lives and acts, and the future of a society can be foreseen by observing its families. If we reflect on personal identity, on why we are some way and not another, why do we act the way we do, why do we lean towards certain direction, a large part of the answers lie in each one's family history¹. The origin, diagnosis,

Correspondence:

*Edgar Manuel Vásquez-Garibay
Instituto de Nutrición Humana
Hospital Civil de Guadalajara Dr. Juan I. Menchaca
Salvador Quevedo y Zubieta, 750
Col. Independencia, C.P. 44340, Guadalajara, Jal., México
E-mail: vasquez.garibay@gmail.com

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prognosis and care of many diseases show genetic, affective, educational, demographic and environmental determinants that are inherent to the family.

Nuclear, single-parent and enlarged or extended families

In Mexico, and in the rest of the world, there are multiple types of families whose in-depth analysis is not the purpose of this review. The most common are the nuclear, single-parent and enlarged or extended families.

Nuclear family

The family comprised by a father-provider, a reproductive mother in the domestic setting and children has been considered the model of family organization. Within the modernizing system, the nuclear family was encouraged as a “natural”, necessary and unavoidable process, a path that men and women had to follow². However, the existence of homes with a different organization is a reality, and single-parent and enlarged or extended families are some examples of it. The variations in the forms of integration of a family diversify the gender roles and the relations of power that exist within; this way, the role of provider and head is determined by the type of family structure.

Regarded as the head has been the member of the family who is in a superior hierarchical position in comparison with the rest of the family organization; it is the one who holds more authority in decision making and the main economic support of the household. Traditionally, the role of head of the family is assigned to the male because gender stereotypes appoint him as the provider. However, factors such as marital abandonment, males' great mobility, females' longer life expectancy and incorporation of women to the extradomestic labor market have determined an increase in the number of homes with a female head³.

Enlarged family

The term enlarged family has different meanings: it is used as a synonym of consanguineous family; it is a kinship network with an extension that goes beyond the nuclear or primary familiar group; it refers to a kinship structure that lives in a same place and is comprised by parental members of different generations. It is characterized by a network of relatives who participate as a close community; it includes parents, children, siblings of parents with their own children,

greatparents, great uncles, great-greatparents (predecessor generations), and can even include non blood-related relatives such as, for example, half brothers, adoptive or putative children. There are cultures where the enlarged family is a basic form of family unit. This way, when a person completes its development towards adulthood, there is not necessarily a separation from parents or relatives. When he/she grows up, the person gets integrated to the broader settings of adults without drifting away from the familiar community⁴.

Single-parent family

It is the family constituted by only one parent and one or more children. It is a kind of family headed by a single adult person, male or female, of whom the other members depend economically and socially. It is a family formed by an adult who lives alone in charge of one or more children, and its generation must have followed any of the following pathways: death of one of the spouses in a marriage with small children; rupture of a couple with small children due to conflicts between its members, with the custody of the children left to one of the parents; single mother with one or more children born off-marriage⁵.

An idea on the frequency of Mexican family types is provided by the National Institute of Statistics and Geography (INEGI – *Instituto Nacional de Geografía y Estadística*)⁶ In the 2010 Population and Housing Census, the INEGI classified Mexican homes as familiar and non-familiar. It considers as familiar those homes where at least one of the members is related to the household head; in turn, it divides the familiar home into: nuclear, extended and mixed. A non-familiar home would be that where none of the members is related to the household head; it is divided in: single-person and co-resident home. This way, for the purposes of population census, the concepts of home and family would be different.

The family and its dynamics

The described information gives us an idea on the complexity of the family structure and, in consequence, on the difficulty to consider the functionality or dysfunctionality of a determinate family dynamics. Although marriage and family have prevailed as the basic institutions of mankind over time, the remarkable scientific and technological advances, the extraordinary innovations on information technology and communications and the transformations of political and economic systems

have produced deep changes in marital life and in the bosom of family. In this new social context, the role of women in the family, their expectations, their educational level and the interest on their personal development have been modified, and we could say that their quality of life has improved. In consequence, the structure of parental authority and its influence on the family have been modified⁷.

Apparently, the nuclear family (parents and children) would be the natural setting to achieve adequate growth and development for individuals in formation stages and to facilitate the socialization process of children. It has to be acknowledged that Mexico, being a highly heterogeneous country, and due to its idiosyncrasy, maintains a considerable number of enlarged or extended families (26%), particularly in rural, ethnic zones and alienated areas of big cities, where family dynamics and functionality would have different characteristics than those observed in nuclear families.

The complex nature of the familiar system makes it almost impossible to define the functioning of a family as being "normal" or "abnormal" and the consideration of "functional" or "dysfunctional" family dynamics has been suggested. A functional family would be that where the children do not show serious behavior disorders and the parents are not in constant quarrel. This "functional" family does not exclude the presence of negative feelings such as resentment, jealousy, etc., ambivalent or dissatisfaction attitudes, or positive feelings such as love, altruism, respect, etc.⁸. Family dynamics is influenced by certain areas (biological, sociocultural, psychological, educational, economic and affective), inside of which the family members "function" as individuals or as group. These areas are related to each other and, therefore, their influences and contributions to the family's own dynamics are overlapped, potentiated or decreased⁹.

In a comprehensive pediatric approach, it is important to identify the "functionality" of family dynamics because the child depends entirely on others (usually the parents) and lacks the capacity to discern if his/her family "functions" adequately or inadequately¹⁰. For the purposes of the present review, a first exploratory step into the family dynamics should be based on two operative assumptions: the nuclear family represents the appropriate social structure for optimal growth and development of the human being and possible alterations in its dynamics might cause disorders in the behavior of its members, especially of those most vulnerable, with biological and psychoaffective consequences in the long term¹¹.

Syndrome

In medicine, a syndrome (from the Greek *σύνδρομη*, *syndromé*, 'concurrency') is a clinical condition or set of symptoms presented by some disease with certain significance and that due to its characteristics it possesses certain identity, i.e., a significant set of signs and symptoms (semiological data) concurring in time and form, with varied causes or etiology. Every syndrome is a clinical entity that assigns a particular or general meaning to the semiological manifestations that compose it. The syndrome is plurietiological because these semiological manifestations can be produced by different causes¹².

Primary cause malnutrition syndrome¹³

It's a pathological condition caused by a diet inadequate for health, without an underlying organic disease that, as a consequence, contributes to a nutritional imbalance in the human being, either by deficiency, insufficiency or excess in the consumption of foods. In general, it is caused by a serious failure in the intake of food, due to poverty conditions, defects in alimentary habits, overt alimentary behavior disorders or excessive consumption of fats and sugars that lead to overweight and obesity, and to the consumption of harmful diets that can deteriorate the nutritional balance of the body (Fig. 1).

Nutritional imbalance can put the life of an individual at risk, leave irreversible sequels for the rest of an individual's life or secondarily produce other nutrition-related chronic diseases (e.g., cardiovascular diseases, high blood pressure, type 2 diabetes mellitus, dyslipidemias, etc.). The presence of malnutrition syndrome is particularly serious during the first 1000 days of life in the human being and, in general, at all stages of growth and development due to the consequences it has on quality of life and on the potential capabilities of a human being¹⁴.

Is family dynamics dysfunction important in the malnutrition syndrome in Mexico?

Since the decade of 1990, families of children with serious primary malnutrition who are admitted in public hospitals for low income people have been observed to have certain characteristics that appear to differ from those in other families apparently of the same socioeconomic stratum, whose children do not exhibit serious primary undernourishment. Some traits of these

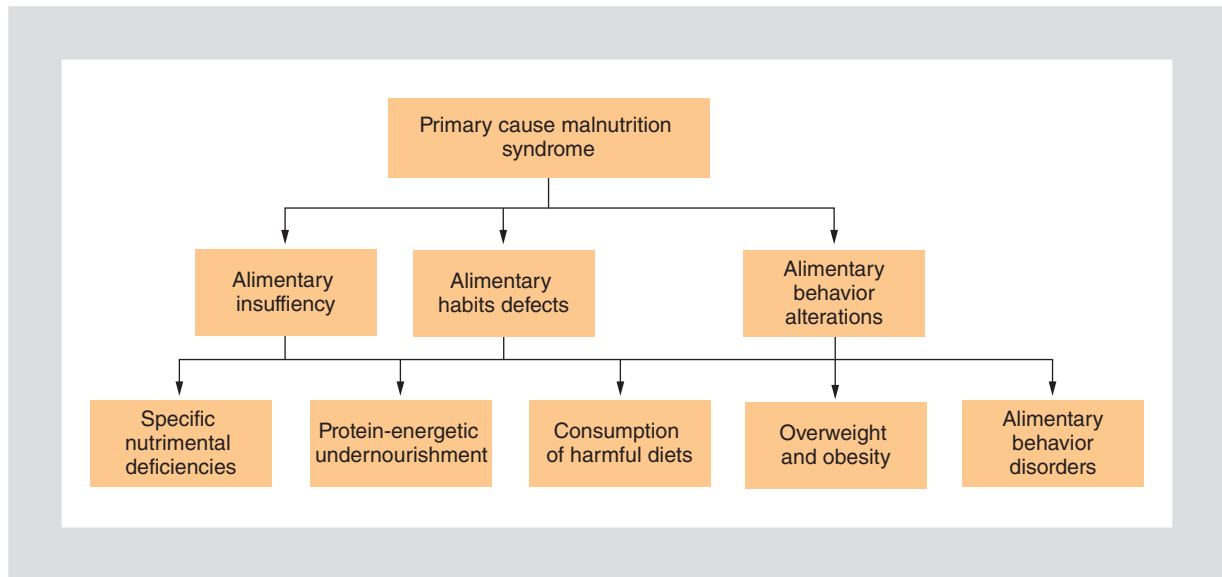


Figure 1. Components of the primary cause malnutrition syndrome.

families of seriously undernourished children have led us to suspect that there could be some disturbances in family dynamics. This way, in order to assess the malnutrition syndrome entities, we have developed a first family dynamics instrument with a quantitative focus that allows for the “functionality” of families to be qualified.

Family dynamics dysfunction as a risk factor associated with serious primary undernourishment¹⁵

A case ($n = 15$)-control ($n = 15$) study was conducted. The cases were children with serious primary undernourishment who were admitted to the departments of infants, preschool children, schoolchildren and infec-tology of the Nuevo Hospital Civil de Guadalajara, and the controls were children without serious primary undernourishment who were admitted in the same departments. We included as independent variables the sex and age of the child; the number of living children, marital status, occupation and education of the parents; the expenditure on food per capita as a percentage of the minimum wage (MW); the type of family; alcohol and/or drugs adiction of the parents and the admission diagnosis, and, as dependent variable, the family dynamics score. The family dynamics score was observed to be significantly lower in families with seriously undernourished children. With a multiple regression model and the family dynamics score as the dependent variable, the variables with significant differences between cases and controls were included,

and the number of family members ($p < 0.001$) and the expenditure on food per capita as a percentage of the MW ($p = 0.003$) were found to remain in the model that explained 59% of variability in the family dynamics score. We concluded that these two variables would act as independent stressors, that in any case they would be potentiated, and that together they would constitute risk factors for family dynamics dysfunction and serious primary undernourishment in the child.

Mexican nuclear family dynamics measuring instrument: a quantitative focus¹¹

The above study encouraged the working group to perfectionate the measuring instrument to achieve internal and external validity. The instrument is comprised by eight areas: couple dynamics; identity formation; communication, expression, solidarity; authority structure; conflict management and aggressiveness; discipline and method; sistem of values, and isolation and sociocultural integration. The complete instrument includes 85 items or questions with a dichotomous answer (yes/no), that when it is the desirable one or considered adequate has a value of 1 and when not the desirable one or considered inadequate has a value of 0. This way, each item or question has a value of 1.18 ($100/85 = 1.18$); therefore, if all questions had an adequate answer they would yield a score of 100. Given that the instrument has specific questions for different age groups (schoolchildren and adolescents,

Table 1. Family dynamics score in different populations*

Population	n	x	SD	Author (year)
Lagos de Moreno	43	83.0	9.7	Vásquez-Garibay (2000)
Arandas	52	83.8	12.0	
Jesús María	34	84.1	12.3	
San Miguel El Alto	32	83.6	10.0	
Tepatitlán	51	81.0	11.1	
Guadalajara DIF (parents)	139	85.2	12.8	Ceballos-González (2005)
Guadalajara DIF (parents)	139	83.80	12.9	
Hospital Civil, children without undernourishment	15	84.0	6.6	Vasquez (1995)
Guadalajara DIF, daycare centers	123	85.6	8.5	Vásquez (2007)
UMF No. 34 IMSS-Jalisco, without obesity	120	81.8	10.8	Sandoval (2010)
UMF No. 34 IMSS-Jalisco, with obesity	64	78.8	12.0	
UMF No. 3 IMSS-Jalisco	452	81.0	11.1	González-Rico (2012)
Total	1,248	83.0	10.8	

*n = 1,248; $\mu = 83.0 \pm 10.8$; averages Σ SD = 1.75 (2%).

preschool children and infants), the questionnaire prepared for preschool children families comprises 63 questions and the one for infants, 54. Thus, each question of the questionnaire for preschool children would have a value of 1.59 (100/63) and each question of the one for infants, a value of 1.85 (100/54). The instrument has shown great consistency and low variability in spite of having been applied in populations of different origins and environmental circumstances (Table 1). With this score, a functionality grade for a family was calculated based on the average and the standard deviations (SD) obtained for each of the performed studies: functional family: ≥ 72 points (≥ -1 SD); probably dysfunctional family: from > 61 to < 72 points (from < -1 to > -2 SD); dysfunctional family: ≤ 61 (≤ -2 SD).

Risk factors associated with the nutritional status in infants attending daycare centers¹⁶

This study explored the importance of family dynamics on the nutritional status of infants. It was an observational, cross-sectional analytical study conducted in 123 healthy, full-term born infants of 3 to 12 months of age, of either sex and with birth weight $> 2,500$ g. They attended ordinary scheme daycare centers of the Mexican Institute of Social Security (IMSS – *Instituto Mexicano*

del Seguro Social) from the Guadalajara Metropolitan Zone (GMZ). Infants with genetic or congenital conditions, with fever lasting longer than 48 h, diarrhea or vomiting lasting longer than 24 h were not included, as well as if the survey could not be applied to the father or the mother. The variables permanence of the infant at the daycare center for longer than 8 h ($p = 0.008$), permanence at the daycare center in the mixed versus morning shift ($p = 0.015$), early start of food introduction ($p = 0.015$) and civil union versus married couples (0.048) were observed to be associated with a higher family dynamics score. Probable family dynamic dysfunction < 72 points occurred in 7.3% of cases.

Three questions were prompted by the study: the prolonged permanence of the infant at the daycare center affects familiar dynamics? The dysfunctional family promotes for the mother or the couple to try to maintain the child for longer time at the daycare center? Are there other unidentified factors that promote both longer permanence of the infant at the daycare center and a higher tendency to family dysfunctionality? It was interesting to find out that probable familiar dysfunction was associated with higher risk of early and inadequate introduction of other foods before 4 months of age and substitution of human milk or formula for other foods. In summary, this study gave a first clue on how probable family dysfunction would have an adverse effect on the

maintenance and prolongation of breastfeeding for a longer period and on the inadequate use of supplementary alimentation, basic elements to achieve good nutrition of the infant during the first 24 months of life.

Family dynamics and other factors associated with growth retardation in 12 to 24-month-old children attending a Primary Care Unit¹⁷

An observational, cross-sectional analytical study included 300 children aged 12 to 24 months of both sexes from the population under the care of the No. 39 Family Medicine Unit (UMF – *Unidad Médica Familiar*) of the IMSS Jalisco. Those with birth weight greater than 2,500 g, coming from nuclear families, with mothers who knew how to read and write accepting to participate, and lived in the same house with their husbands, were selected. Children attending the Department of Emergencies, those with genopathies, congenital or chronic diseases, physical sequels or some physical impairment were not included. For this study, an instrument known as modified family APGAR was used. This instrument is comprised by five parameters that perceive familiar functioning and five possible answers in categories from 0 to 4, where 0 is never and 4 always. The instrument explores the degree of satisfaction in 5 basic parameters: adaptation, participation, earning or growth, affection and resources¹⁸⁻²⁰. This family dynamics measurement instrument has been used in Hispanic populations, for example, in Spain²¹⁻²³ and Venezuela²⁴. When the five parameters are added, the score ranges from 0 to 20, indicating low or high levels of satisfaction. A score of 18 to 20 is considered good functionality; from 14 to 17, mild dysfunction; from 10 to 13, moderate dysfunction, and lower than 10, serious dysfunction. The study demonstrated that family dynamics dysfunction was a risk factor associated with deficit in the indicator of height for age as an expression of chronic undernourishment (OR: 14.2 [2.7-74.9]; $p = 0.002$).

Influence of family dynamics and other factors associated with deficit in the nutritional status of preschool children attending Child Development Centers (CDI) of the Family Comprehensive Development System (DIF) of Jalisco²⁵

In a cross-sectional analytical study, 140 preschool children who attended Child Development Centers

(CDI – *Centros de Desarrollo Infantil*) of the GMZ, coming from nuclear families with both parents living in the same home, were included. Six CDI were randomly selected from a total of 13. The selected CDI were the following: no. 2 ($n = 24$), 4 ($n = 29$), 5 ($n = 18$), 7 ($n = 25$), 9 ($n = 28$) and 13 ($n = 16$). Children from 15 to 59 months of age of either sex, with mothers working outside their homes, regardless of the occupational activity, and with consent to participate in the study, were included. Children of single mothers, divorced or separated parents, and preschool children with some genetic, congenital or chronic disease were not included. Sixty-three items or questions applicable to nuclear families with children younger than 72 months were selected, with a weighing factor by question of 1.59. A significant association was observed between the weight/height index deficit (≤ -2 SD) and a low family dynamics score according to the mothers and fathers interviewed separately (≤ -2 SD vs. > -2 SD) (OR: 38.4 [4.4-336]; $p = 0.001$; and OR: 21 [2.05-215]; $p = 0.02$, respectively) and education of the father lower than six years of primary school (OR: 10.6 [2.0-54.6]; $p = 0.028$). In addition, the deficit in the height by age or failure to thrive indicator (< -2 SD) was observed to be associated with an elevated number of members at home (≥ 4 vs. < 4) (OR: 10.1 [1.17-88.1]; $p = 0.022$) and with a low family dynamics score by the mother (≤ -2 SD vs. > -2 SD) (OR: 8.59 [1.64-45]; $p = 0.041$). The multiple regression model showed that education of the father, the number of members at home and the number of living children were the significant variables that explained 36% of variability in the family dynamics score by the father, whereas family income was the only significant variable in the model that explained 21% of the variability in family dynamics score by the mother. This study indicates that the risk factors for acute and/or chronic undernourishment were dysfunctional family dynamics, some kind of employment instability for the mother when she has to work extradomestically (shop-keeper or professional mothers vs. employees), low family income and poor education of the father. Additionally, the reasons for family dynamics low scores may differ between the mother and the father. While poor family income was associated with lower family dynamics score by the mother, poor education of the father and larger number of members at home were associated with lower dynamics score by the father. This finding is interesting since apparently the reasons why family dynamics scores are lower or higher seem to be driven by the fact that the perception the mother and the father have on what occurs in

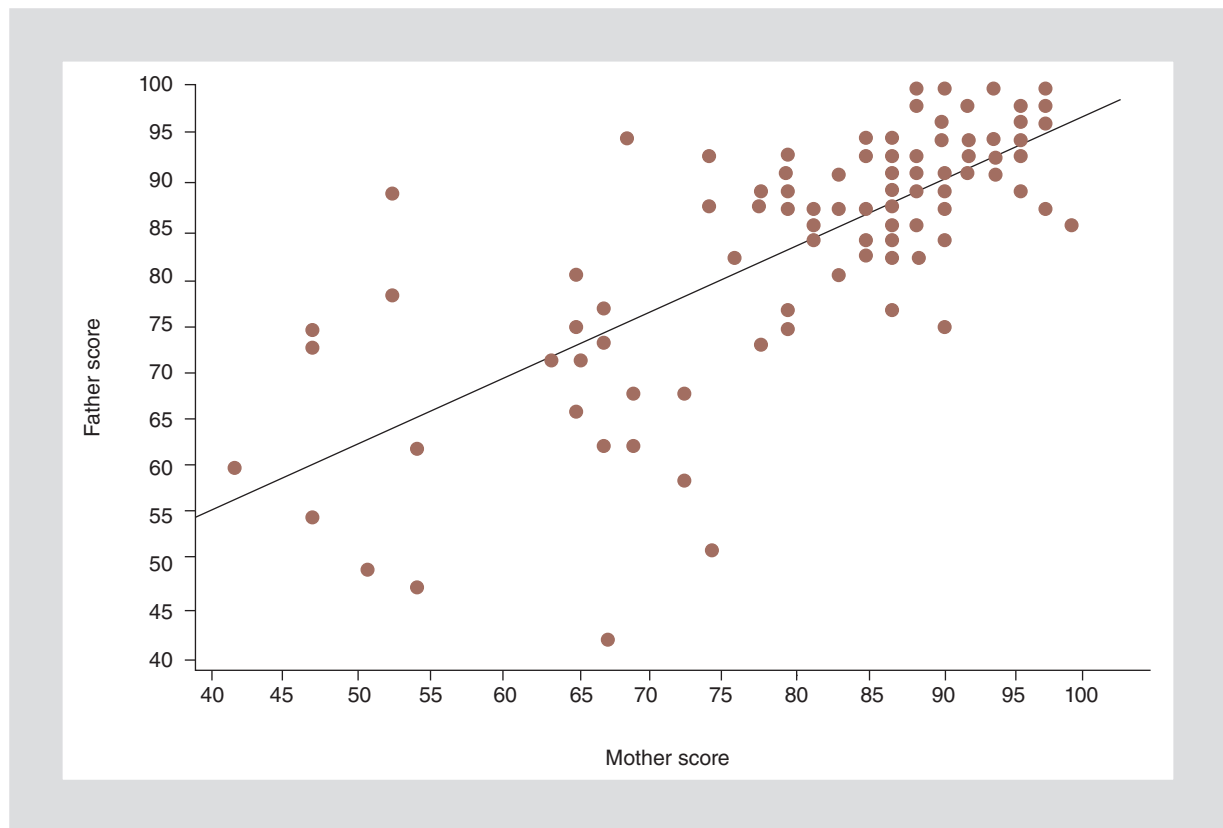


Figure 2. Family dynamics score between the assessment by the father and the mother ($r = 0.759$; $p < 0.001$). A progressive dispersion is observed as the mother score decreases below 80 points²⁶.

each family is different, although both parents' final score, in most cases, appears to be concurrent.

Degree of correlation in the perception of family dynamics by both parents of preschool children attending a CDI of the Jalisco DIF²⁶

With the purpose to explore if the perceptions of the father and the mother on their own family dynamics were consistent, the correlation of the family dynamics score between the mother and the father was explored. The correlation was observed to be quite good ($r = 0.759$; $p < 0.001$); however, the score dispersion increased as the scores decreased below 80 points; in contrast, the regression improved as the score increased (Fig. 2). This finding would mean that the higher the score in the family dynamics assessment, the higher the agreement of the parents on the perception of family dynamics, whereas the lower the score, the lower the affinity or perception between them with regard to their own family dynamics. Probably, stressors such as educational shortcomings of the parents, higher number of

members in the family and economic scarcity would explain these differences in parents with lower scores. The correlation between the score of each one of the family dynamics areas of the father and the mother showed that there was highly significant coincidence in most areas, particularly in couple dynamics, conflict management and aggressiveness, discipline and method, system of values and isolation and sociocultural integration ($r > 0.500$; $p < 0.001$). Interestingly, the area where the father and the mother were least correlated was in the authority structure ($r = 0.268$). It is possible for this weak correlation to be driven by the fact that both parents work away from home, generate income for the family and, therefore, it appears that there are more difficulties to clearly establish the authority role between them.

Obesity in six to nine-year-old children: socioeconomic and demographic factors and family dysfunction²⁷

So far, we have seen that family dynamics low score is associated with serious primary undernourishment

and failure to thrive in age groups younger than five years. However, we wanted to further explore if there was family dynamics potential dysfunction in schoolchildren with obesity, another entity that forms part of the malnutrition syndrome. Thus, a case-control study was conducted with 184 children of 6 to 9 years of age (64 cases and 120 controls) who attended the no. 34 UMF of the IMSS; the participants had a birth weight of 2,500 to 4,000 g, came from nuclear families, and were accompanied by the father or the mother. The cases were schoolchildren with a body mass index (BMI) above the 95th percentile for age and sex; tricipital cutaneous fold (TCF) above the 90th percentile for age and sex. The controls had a BMI between the 5th and 85th percentiles, and the remaining criteria were similar to those of the cases. Children who attended emergencies, with congenital, genetic or chronic diseases or physical impairments were not included. The frequency of dysfunctional and potentially dysfunctional families was observed to be 10.5% higher in children with obesity, but this trend was not significant. Additionally, a higher score was observed in parents of children without obesity in the areas of couple dynamics ($p = 0.053$) and family authority structure ($p = 0.061$). Family dynamics total score showed a trend to be higher in parents of children without obesity than in parents of children with obesity: 81.8 ± 10.8 vs. 78.8 ± 12.0 , respectively ($p = 0.09$)²⁷. We concluded that family dynamics dysfunction could be yet another factor that would add to other widely documented ones: genetic, biological, psychological and environmental (epigenetic) factors that would explain the origin of obesity in the child, and that a study with a larger number of cases would be required to demonstrate the potential effect of family dynamics dysfunction on child obesity.

Family dysfunction as a risk factor for obesity in Mexican schoolchildren²⁸

With this idea in mind, we undertook the task of conducting another study to identify the association between obesity and family dysfunction in children affiliated to an IMSS UMF who lived in the Guadalajara metropolitan zone. A new case-control study was carried out with 452 children of either sex from 6 to 9 years of age. There were 156 cases and 296 controls assigned to the IMSS no. 3 UMF. Those participants with a birth weight above 2,500 g, coming from nuclear families, with mothers who knew how to read and write and who lived in the same home with their husbands were included. Children with genopathies, congenital

or chronic conditions or with some physical impairment were not included. The following were considered independent variables: BMI > 95th percentile and TCF > 90th percentile; and independent variables: couple dynamics; identity formation; communication; authority structure; conflict management and aggressiveness; discipline and method; system of values, and isolation and sociocultural integration. We included other variables such as sex, dietary history, number of living children, parents' level of education, parents' occupation, and expenditure per capita on food (percentage of MW). In both groups, with and without obesity, males were predominant (56.4 and 52.7%). By age groups (from 6 to 9 years), the frequency of cases with obesity was slightly higher in younger children (9%). The families of the entire study population were comprised by 5 or less members (84%). The frequency of obese children who lived in dysfunctional or potentially dysfunctional families was higher (51.9%) than that in non-obese children (39.9%) (OR: 1.63 [1.08-2.46]; $p = 0.01$). The identity formation (75 vs. 87.5) and discipline and method areas (83.3 vs. 91.6) showed a significantly lower score in children with obesity than in those without obesity ($p = 0.001$ and $p = 0.005$, respectively). Total score was also significantly lower in children with obesity than in children without obesity (82.9 and 85.9, respectively; $p = 0.008$). In a logistic regression model, only family functionality (OR: 1.79 [1.19-2.71]; $p = 0.005$) and education of the mother (OR: 1.61 [1.06-2.35]; $p = 0.02$) were shown to be associated with obesity. Similar findings have been observed in other recent studies²⁹⁻³². These results reinforced the previous impression that family dynamics dysfunction would act as a risk factor for obesity in children aged 6 to 9 years. These results are also consistent with other studies that have described that children living in unfavorable family environments, where there is abuse or difficult relations between parents and children, generate alterations or overt alimentary behavior disorders that end up in obesity³³⁻³⁵. In Mexico it is increasingly common to observe non-nuclear families (extended, mixed, single-parent, etc.), with dysfunctional problems or stressing factors generated among their members. Therefore, it is important to further explore the role played by the dynamics of Mexican families (nuclear and non-nuclear) in the pathogenesis of obesity and its comorbidities in children. Once the association between family dynamics dysfunction and obesity in children was demonstrated, the next question was: which factors are associated with lower family dynamics

scores in families of children with obesity? Low level of education of fathers and mothers was observed to have around two-fold more probabilities of family dynamics dysfunction (OR: 2.06 [1.37-3.10] and OR: 2.47 [1.57-3.89], respectively). Furthermore, low economic income and low expenditure on the purchase of food were associated with family dynamics dysfunction ($p < 0.05$)³⁶.

In conclusion, family dynamics dysfunction was shown to be present as a risk factor associated with alimentary deficits during the first year of life, and with acute and chronic primary undernourishment in the child younger than 5 years. On the other hand, it is widely recognized that the problem of childhood obesity is quite complex, because it is multifactorial. Behind the unbalance of the higher ingestion and lower energy expenditure dyad, there are underlying factors such as low education, alimentary culture and socio-economic status of the families; alimentary habits defects such as the consumption of sweetened beverages; alterations in the alimentary behavior; lack of adequate regulation of the consumption of high energetic density foods in schools; lack of regulation on the advertising of fat and carbohydrate-rich processed foods that is diffused through television and other diffusion media; reduced physical activity due to the lack of adequate programs established by the corresponding municipal, state and federal authorities; the sedentary behaviors of children due to the unavailability of adequate spaces for physical activity, especially in densely populated urban areas, etc.³⁷⁻⁴⁹. However, we couldn't overlook that, in the bottom of several of the above mentioned factors, and acting independently, family dynamics dysfunction is an important factor that has to be analyzed every time more carefully when measures for the management and prevention of chronic undernourishment, overweight and obesity of the child are taken. A pending task around family dynamics is to explore how the degree of functionality should be assessed in the composed, extended and single-parent families and other type of families where there is vulnerable population (particularly children) to the different entities of the malnutrition syndrome and that depends on adults' decision for its care, nutrition and alimentation. Moreover, family dynamics dysfunction can be a risk factor for other conditions not directly associated with the malnutrition syndrome, such as alcoholism, drug addiction, crime, etc., which are observed since early stages of life, and other sociopathic behaviors that might affect children or adolescents coming from dysfunctional families.

Conflict of interests

None

References

- Ortiz Gómez MT. La salud familiar. *Rev Cubana Med Gen Integr.* 1999;15:439-45.
- Lázaro Castellanos R, Zapata Martelo E, Martínez Corona B, Alberti Manzanares P. Jefatura femenina de hogar y transformaciones en los modelos de género tradicionales en dos municipios de Guanajuato. *Revista de Estudios de Género. La ventana.* 2005;22:219-68.
- García Vences DE (2005). Mujeres pobres jefas del hogar en México. Universidad Autónoma del Estado de México. [Internet] Consultado el día 20 de septiembre de 2014. Disponible en: http://www.globaljustice-center.org/ponencias2005/garcia_vences_esp.htm
- La familia. 2011. [Internet] Consultado el día 20 de septiembre de 2014. Disponible en: <http://lafamiliageneralidades.blogspot.mx/p/como-es-una-familia-extensa.html>
- Borrajó Iniesta S. Ruptura matrimonial y formación de familias monoparentales en España. En: Iglesias de Ussel J, ed. *Las familias monoparentales.* Madrid: Ministerio de Asuntos Sociales, Instituto de la Mujer, Serie Debate, núm. 5; 1988. p. 41-8.
- Instituto Nacional de Estadística y Geografía (INEGI). Censo de Población y Vivienda 2010 INEGI. [Internet] Consultado el 20 de septiembre de 2014. Disponible en: <http://cuentame.inegi.org.mx/poblacion/hogares.aspx?tema=P>
- Satir V. *Psicoterapia familiar conjunta.* México, D.F.: Editorial Prensa Médica Mexicana; 1986. p. 86-8.
- Chagoya L. Dinámica familiar y patología. En: Dulanto E, ed. *La familia: medio propicio o inhibidor del desarrollo humano.* México, D.F.: Ediciones Médicas del Hospital Infantil de Médico; 1975. p. 25-30.
- OPS. *Salud materno-infantil y atención primaria en las Américas. Hechos y tendencias.* Montevideo: Oficina Panamericana Sanitaria, publicación científica n.o 464; 1984. p. 194-204.
- Vásquez-Garibay E, Franco AA, Nápoles RF, Chavira LAR, Sánchez TE. Características socioeconómicas y demográficas y la dinámica familiar en preescolares de los Altos de Jalisco. *Investigación en Salud.* 2000;11(3):188-95.
- Vásquez Garibay E, Sánchez TE, Navarro LME, Romero VE, Pérez CL, Kumazawa IM. Instrumento de medición de la dinámica de la familia nuclear mexicana: Un enfoque Cuantitativo. *Bol Med Hosp Infant.* 2003;60:33-52.
- Cortés F. Síndrome. *Diccionario médico-biológico, histórico y etimológico.* Ediciones Universidad de Salamanca. Junio de 2009. [Internet] Consultado el 20 de septiembre de 2014. Disponible en: <http://dicciomed.eusal.es/palabra/sindrome> <http://es.wikipedia.org/wiki/S%C3%AADndrome>
- Vásquez-Garibay EM, Álvarez-Treviño L, Romero-Velarde E, Larrosa-Haro A. Importancia de la transición nutricia en la población materno-infantil. Parte I. Experiencias en México. *Bol Med Infant Mex.* 2009;66:109-24.
- Bhutta ZA. Early nutrition and adult outcomes: pieces of the puzzle. *Lancet.* 2013;382(9891):486-7.
- Vásquez Garibay E, Vallarta CG, Sánchez TE, Nápoles RF, Romero VE. Disfunción de dinámica familiar como factor asociado a desnutrición primaria grave. *Bol Med Hosp Infant Mex.* 1995;52:698-705.
- Vásquez Garibay EM, Ávila Alonso E, Contreras Ramos T, Cuellar Espinoza L, Romero Velarde E. Factores de riesgo asociados al estado nutricional en lactantes que son atendidos en guarderías de Guadalajara. *Bol Med Hosp Infant Mex.* 2007;64:18-28.
- González-Rico JL, Vásquez-Garibay E, Sánchez-Talamantes E, Nápoles-Rodríguez F. Dinámica familiar y otros factores asociados al retardo en el crecimiento en niños de 12 a 24 meses que acuden a la UMF No. 39 del IMSS. *Bol Med Hosp Infant Mex.* 2007;64:143-52.
- Smilkstein G. The family APGAR: a proposal for family function and its use by physicians. *J Fam Pract.* 1978;6(6):1231-9.
- Smilkstein G, Ashworth C, Montano D. Validity and reliability of the family Apgar as a test of family function. *J Fam Pract.* 1982;15(2):303-11.
- Smilkstein G. Family APGAR analyzed. *Fam Med.* 1993;25(5):293-4.
- Bellón Saameño JA, Delgado Sánchez A, Luna del Castillo JD, Lardelli Claret P. [Validity and reliability of the family Apgar family function test]. *Aten Primaria.* 1996;18(6):289-96.
- De la Revilla L. [Family dysfunction]. *Aten Primaria.* 1992;10(2):582-3.
- Rodríguez-Fernández E, Gea Serrano A, Gomez-Moraga A, García-González JM. [Apgar questionnaire in the study of family function]. *Aten Primaria.* 1996;17(5):338-45.
- Molina L, Henry A, D'Jesús P, Marileidy T. Factores de riesgo en adolescentes de la calle. *Arch Venez Puer Pediatr.* 1998;60:115-6.

25. Ceballos GA, Vásquez-Garibay E, Nápoles RF, Sánchez TE. Influencia de la dinámica familiar y otros factores asociados al estado nutricional de preescolares en guarderías del sistema Desarrollo Integral de la Familia (DIF) Jalisco. *Bol Med Hosp Infant*. 2005;62:104-16.
26. Nápoles RF, Ceballos GA, Sánchez TE, González RJL, Romero VE, Vásquez-Garibay E. Grado de correlación en la percepción de la dinámica familiar entre ambos padres de preescolares que acuden a Guarderías del DIF Jalisco. *Bol Med Hosp Infant Mex*. 2005;62:177-88.
27. Sandoval Montes IE, Romero Velarde E, Vásquez Garibay EM, et al. [Socioeconomic, demographic and family dysfunction related to obesity in 6 to 9 year-old children]. *Rev Med Inst Mex Seguro Soc*. 2010;48(5):485-90.
28. González Rico JL, Vásquez Garibay EM, Cabrera Pivaral CE, González Pérez GJ, Troyo Sanromán R. [The family dysfunction as a risk factor of obesity in Mexican school children]. *Rev Med Inst Mex Seguro Soc*. 2012;50(2):127-34.
29. Renzaho AM, Kumanyika S, Tucker KL. Family functioning, parental psychological distress, child behavioural problems, socio-economic disadvantage, fruit, and vegetable consumption among 4–12 year-old Victorians, Australia. *Health Promot Int*. 2011;26(3):263-75.
30. Renzaho AMN, Dau A, Cyril S, Ayala GX. The influence of family functioning on the consumption of unhealthy foods and beverages among 1- to 12-y-old children in Victoria, Australia. *Nutrition*. 2014; 30(9):1028-33.
31. Clifton PM, Chan L, Moss CL, Miller MD, Cobiac L. Beverage intake and obesity in Australian children. *Nutr Metab (Lond)*. 2011;8:87.
32. Pabayo R, Spence JC, Cutumisu N, Casey L, Storey K. Sociodemographic, behavioural and environmental correlates of sweetened beverage consumption among pre-school children. *Public Health Nutr*. 2012; 15(8):1338-46.
33. Skelton JA, Irby MB, Grzywacz J, Miller G. Etiologies of Obesity in Children: Nature and Nurture. *Pediatr Clin North Am*. 2011;58(6):1333-54.
34. Sothorn M, Gordon ST. Prevention of obesity in young children: a critical challenge for medical professionals. *Clin Pediatr*. 2003;42(2):101-11.
35. Zametkin A, Zoon C, Klein H, Munson S. Psychiatric aspects of child and adolescent obesity: a review of the past 10 years. *J Am Acad Child Adolesc Psychiatry*. 2004;43(2):134-50.
36. Vásquez-Garibay EM, Gonzalez-Rico JL, Cabrera-Pivaral C, González-Pérez G, Troyo-Sanroman R. Associated factors to family dysfunction in obese and non-obese school children. *FASEB J*. 2011;25:591-3.
37. Jensen BW, Nielsen BM, Husby I, et al. Association between sweet drink intake and adiposity in Danish children participating in a long-term intervention study. *Pediatr Obes*. 2013;8(4):259-70.
38. Ambrosini GL, Oddy WH, Robinson M, et al. Adolescent dietary patterns are associated with lifestyle and family psycho-social factors. *Public Health Nutr*. 2009;12(10):1807-15.
39. Andaya AA, Arrendondo EM, Alcaraz JE, Lindsay SP, Elder JP. The association between family meals, TV viewing during meals, and fruit, vegetables, soda, and chips intake among Latino children. *J Nutr Educ Behav*. 2011;43(5):308-15.
40. Anzman SL, Rollins BY, Birch LL. Parental influence on children's early eating environments and obesity risk: implications for prevention. *Int J Obes*. 2010;34(7):1116-24.
41. Bacardi-Gascon M, Pérez-Morales ME, Jiménez-Cruz A. A six month randomized school intervention and an 18-month follow-up intervention to prevent childhood obesity in Mexican elementary schools. *Nutr Hosp*. 2012;27(3):755-62.
42. Birch LL, Fisher JO. Mothers' child-feeding practices influence daughters' eating and weight. *Am J Clin Nutr*. 2000;71(5):1054-61.
43. Gómez-Miranda LM, Jiménez-Cruz A, Bacardi-Gascón M. Randomized clinical trials on the sugar-sweetened beverages on adiposity in older than 13 y; systematic review. *Nutr Hosp*. 2013;28(6):1792-6.
44. McGinnis JM, Gootman JA, Kraak VI. Food marketing to children and youth: threat or opportunity? Washington, DC: National Academies Press; 2006.
45. Neumark-Sztainer D, MacLehose R, Loth K, Fulkerson JA, Eisenberg MW, Berge J. What's for dinner? Types of food served at family dinner differ across parent and family characteristics. *Public Health Nutr*. 2014; 17(1):145-55.
46. Pereira MA, Kartashov AI, Ebbeling CB, et al. Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis. *Lancet*. 2005;365(9453):36-42.
47. Sanigorski AM, Bell AC, Swinburn BA. Association of key foods and beverages with obesity in Australian schoolchildren. *Public Health Nutr*. 2007;10(2):152-7.
48. Vargas L, Jiménez-Cruz A, Bacardi-Gascón M. Unhealthy and healthy food consumption inside and outside of the school by pre-school and elementary school Mexican children in Tijuana, Mexico. *J Community Health*. 2013;38(6):1166-74.
49. Yannakoulia M, Papanikolaou K, Hatzopoulou I, Efsthathiou E, Papoutsakis C, Dedoussis GV. Association between family divorce and children's BMI and meal patterns: the GENDAI Study. *Obesity*. 2008;16(6):1382-7.