



■ Original article

The importance of socioeconomic factors in symptoms of heartburn

Navarro-Rodríguez F,¹ Chaves RCM,² Dib RA,² Navarro-Rodríguez T³

- 1 MSc in Health Sciences from Lusiada University, Santos (UNILUS); Private Gastroenterology Clinic in Santos.
- 2 Physician-Endoscopist.
- 3 Attending Physician in the Gastroenterology Service, Hospital das Clínicas, University of São Paulo School of Medicine, São Paulo, Brazil.

Received March 25th, 2011; accepted April 15th, 2011.

■ Abstract

Introduction: Patients' socioeconomic status is rarely assessed during medical consultations.

Objective: To correlate patients' socioeconomic conditions with symptoms of heartburn.

Methods: 1184 patients who answered a questionnaire in three cities on the coast of the State of São Paulo, Brazil, were evaluated prospectively. Socioeconomic status was assessed using several criteria: number of bathrooms, consumer goods present at home, health conditions at home, comfort (cars and/or home helps), monthly family income and head of household's educational level.

Results: 583 patients (49.2%) reported occurrences of heartburn over the 30 days preceding the consultation, with frequencies ranging from five

Keywords:
Gastroesophageal
reflux disease,
heartburn, symp-
toms, risk factors,
Brazil.

■ Resumen

Introducción: El estrato socioeconómico de los pacientes rara vez es evaluado en las consultas médicas.

Objetivo: Correlacionar las condiciones socioeconómicas de los pacientes con la presencia de pirosis.

Métodos: Se evaluaron prospectivamente 1184 pacientes quienes respondieron un cuestionario en tres ciudades. Las clases socioeconómicas fueron evaluadas usando diversos criterios: número de baños, consumidores de bienes presentes en la casa, condiciones de salud en la casa, confort (autos y empleados), ingreso familiar mensual y nivel educacional de la cabeza familiar.

Resultados: 583 pacientes (49.2%) reportaron haber tenido pirosis en los 30 días previos a la consulta, con frecuencias entre cinco a 30 episodios

Palabras clave:
Enfermedad por
reflujo gastroeso-
fágico, pirosis,
síntomas, factores
de riesgo, Brasil.

to thirty episodes over this period. Among patients from the city of Guarujá (low socioeconomic condition), 9.7% had never felt heartburn, while 65.7% reported occurrences, reaching statistical significance in relation to patients of medium socioeconomic condition (city of São Vicente) ($p = 0.012$). There was no difference between patients from medium socioeconomic condition and patients from Santos (high socioeconomic condition) ($p = 0.997$). There was a statistically significant difference in occurrence of heartburn between the patients with high socioeconomic condition and those of low socioeconomic condition ($p = 0.002$).

Conclusions: The least favored socioeconomic status patients, as confirmed according to a variety of socioeconomic factors, presented greater incidence of heartburn than did the most favored social class.

durante este periodo. Entre los pacientes de la ciudad de Guarujá (condiciones socioeconómicas bajas), 9.7% nunca sintieron pirosis, mientras 65.7% señalaron pirosis, alcanzando significado estadístico en relación a los pacientes con condiciones socioeconómicas medias (São Vicente, $p = 0.012$). Entre los pacientes de la ciudad de São Vicente (con condiciones socioeconómicas medias) y la ciudad de Santos (condiciones socioeconómicas altas) no hubo diferencia significativa ($p = 0.997$). Hubo diferencia estadísticamente significativa entre los pacientes con condición socioeconómica alta y baja ($p = 0.002$).

Conclusiones: La clase social menos favorecida, como se confirmó de acuerdo a la variedad de factores socioeconómicos, presentó mayor incidencia de la pirosis que los pacientes de clase social más alta.

■ Introduction

Heartburn is one of the main symptoms of gastroesophageal reflux disease. This disease is considered to be a public health problem throughout the Western world.¹ Around 10% of the adult population of the United States reports suffering from heartburn on a daily basis² and in Brazil heartburn presents weekly prevalence in 11.9% of the population.³

Within this high general prevalence certain factors present a close relationship with greater severity of gastroesophageal reflux. Among these are age,⁴ obesity,^{4,5} increased intra-abdominal pressure⁶ and cigarette smoking.^{1,5} However the mechanism that triggers heartburn, regardless of whether gastroesophageal reflux is present or not, is so far only partially understood.⁷

With regard to epidemiological studies one of the factors that should always be brought in mind is the subjects' socioeconomic condition. This has importance as a risk factor⁸ in relation to the diagnosis,^{9,10} treatment,¹¹ prevention and even morbidity-mortality of the disease.¹²

Low socioeconomic level is associated with a large range of diseases.¹³ However, although the correlation between individuals socioeconomic condition and their overall health is well established in Western countries,¹³⁻¹⁵ few studies have evaluated socioeconomic factors in relation to gastroesophageal reflux disease^{10,16} and even fewer in relation to heartburn. Furthermore there is a lack of epidemiological studies focusing on private gastroenterological clinics. Socioeconomic condition is not routinely evaluated in private gastroenterological clinics. This is perhaps because of short time to carry out complete evaluations or because the patients maybe don't understand or accept the importance of such data. Patients often report imprecise data simply because they do not wish to feel diminished or depreciated in front of the physician, or because they cannot see the importance that this information might have for achieving correct diagnosis and treatment for the disease.

Because of the high prevalence of heartburn, its direct correlation with gastroesophageal reflux disease and the poor understanding of this symptom, we decided to conduct this study in order to

correlate heartburn occurrences among patients with different socioeconomic conditions.

■ Methods

We conducted a prospective study over a consecutive 18-month period among 1184 patients living in three cities on the coast of the State of São Paulo, Brazil (Santos, São Vicente and Guarujá) who sought assistance at a private gastroenterological clinic. These subjects answered a previously established questionnaire.

Patients living in one of these three cities who were aged 18 years or over were eligible for inclusion in the study. Pregnant or breastfeeding women, individuals who had undergone surgery on the esophagus and/or gastrointestinal tract (except appendectomy) and individuals who refused to participate in the study were excluded.

The questionnaire was applied by a single examiner and was made simple and with objective questions to avoid confounding issues.

Heartburn was defined as a sensation of retrosternal burning that radiates from the manubrium of the sternum to the base of the neck and into the throat.¹⁷

With the aim of standardizing the procedure for the questionnaire and to avoid biased responses, we chose to apply the questionnaire to the third patient and the last patient on each consultation day. If the third patient did not fulfill the inclusion or exclusion criteria, the next patient was evaluated. If the last patient of the day could not be evaluated, we chose the first patient of the subsequent day.

The clinical questionnaire was divided in four parts. In the first part, personal identification data were sought (name, present address, number of children, marital status and date of birth). In the second, the subjects were asked how often they had felt heartburn or pyrosis over the preceding month and whether such symptoms had interfered with their daily activities and to what extent. In the third, the characteristics of the food consumed in the household were evaluated, along with the educational level of the family member who cooked and the family income. In the fourth and last part, the sanitation conditions of the patient's home were evaluated.

During the medical consultation, we measured the body mass index (BMI), defined as the weight

in kilograms divided by the square of the height in meters (weight/height²). We used the World Health Organization classification, such that individuals with BMI of up to 18.5 kg/m² were considered underweight; 18.6 kg/m² to 25.0 kg/m², normal weight; 25.1 kg/m² to 30.0 kg/m², overweight; 30.1 kg/m² to 40.0 kg/m², obesity; and greater than 40.0 kg/m², morbid obesity.

Qualitative variables were represented by absolute frequencies (n) and relative frequencies (%), and quantitative variables by means, standard deviations (SD), medians, minimum and maximum values. The presence of associations between the variable "city" and the other variables was evaluated using the *chi-square* test. The same test was used to investigate the presence of any association between the most disturbing symptom and patients personal data. Comparisons between the cities were made using the analysis of variance (ANOVA) technique for quantitative variables with normal distribution. Differences were investigated by means of multiple comparison tests. The distinct quantitative variables (number of television, number of radios, etc.) were analyzed using the nonparametric Kruskal-Wallis test for independent samples. Differences were again investigated by means of multiple comparison tests.

Scores were attributed to frequency variables, as follows: never = 0, up to once a month = 1; between two and four times a month = 2; between five and twelve times a month = 3; and between 13 and 30 times a month = 4. The cities were also compared in relation to the frequency scores, using the nonparametric Kruskal-Wallis test.

The significance level was taken to be 0.05 ($\alpha = 5\%$) and descriptive levels (*p*) lower than this value, were considered significant.

The study was performed in accordance with the declaration of Helsinki, the protocol was thoughtfully explained and informed consent was obtained from all patients.

■ Results

A total of 1184 patients living in the three cities who sought consultations with a gastroenterologist were evaluated. Out of this sample, 588 (49.7%) lived in Santos, 255 (21.5%) in São Vicente and 341 (28.8%) in Guarujá. The majority of patients were women (713; 60.2%). The patients' mean age was 45.9 ± 16.3 years, with an age range from 18 to 96

years. Most of the patients were married or cohabiting (698 individuals; 59.0%), while 295 (24.9%) were single, 115 (9.7%) were widowed and 76 (6.4%) were divorced. The mean number of children that the patients had was 1.9 (SD = 1.9). Data on the patients evaluated are showed in **Table 1**.

There were statistically significant differences between the cities regarding the mean BMI among the individuals attended ($p = 0.002$) (**Table 2**).

Comparing the three cities in relation to purchasing power, we inferred that the patients from Santos were in a better economic position than those from the other two cities. This was extrapolated in our study from the greater quantities of electrical equipment installed in the homes in Santos (**Table 3**). These results show that the people living in São Vicente were characterized by better economic conditions than among those living in Guarujá. The other characteristics that were evaluated also showed Santos as the higher economic status city (**Table 3**).

The multiple comparisons test showed that there were statistically significant differences between three cities regarding the education levels of heads of households of the patients attended ($p < 0.001$) (**Table 4**). Furthermore, monthly family income among the individuals attended also presented statistically significant differences between the three cities ($p < 0.001$), as shown by the multiple comparisons test (**Table 5**). The greater economic conditions of patients from Santos in relation to São Vicente and Guarujá reflects their greater

purchasing power as shown through the significantly greater family income in Santos than in São Vicente, which in turn was greater than the family income among patients from Guarujá.

Other findings also demonstrated that the patients from Guarujá were the ones with the worst living conditions. They presented the highest number of people living in the same home and the homes of the patients from Guarujá had fewer bedrooms.

There was a statistically significant difference between the cities regarding the distribution of heartburn frequency during the month preceding the patients consultations ($p = 0.002$). Symptoms at frequencies of five to 30 occurrences over that month were reported by 65.7% of the patients from Guarujá, 55.9% from Santos and 55.7% from São Vicente. The multiple comparisons test showed that the patients from Guarujá differed significantly from those living in the other two cities. **Table 6** shows the distribution of heartburn frequency and the extent to which this symptom interfered with daily activities over the month preceding the consultation, among the 1,184 patients studied. The extent of this interference differed significantly between the cities ($p < 0.001$). Within the range of five to 30 occurrences per month, heartburn symptoms interfered with the daily activities of 56.9% of the patients from Guarujá, 43.5% from Santos and 23.1% from São Vicente. The multiple comparisons test showed that Guarujá differed significantly from the other two cities (**Table 2**).

■ **Table 1.** Data on the patients evaluated.

		Santos 588 (49.7%)	São Vicente 255 (21.5%)	Guarujá 341 (28.8%)	Total (%)	
Gender	Female	356 (60.5)	187 (73.3)	170 (49.9)	60.2%	A
	Age (years) Mean \pm sd	48.0 \pm 16.9	46.3 \pm 16.4	41.9 \pm 14.1	45.9 \pm 16.3	$p < 0.001$
Number of children	Mean \pm sd	1.6 \pm 2.0	2.0 \pm 2.0	2.3 \pm 2.2	1.9 \pm 1.9	B
Marital status	Married / cohabiting	328 (55.8)	142 (55.7)	228 (66.9)	698 (59.0)	C
	Single	155 (26.4)	67 (26.3)	73 (21.4)	295 (24.9)	

SD = standard deviation; A = Santos \neq São Vicente \neq Guarujá; $p < 0.05$

B = Santos \neq São Vicente, Santos \neq Guarujá, São Vicente = Guarujá.

C = Santos = São Vicente, Santos \neq Guarujá, São Vicente \neq Guarujá

■ **Table 2.** Comparison of mean body mass index between the three cities.

City	Body mass index (kg/m ²)				
	Mean	SD	Median	Minimum	Maximum
Santos (n = 588)	25.68	4.45	25.14	13.27	45.42
São Vicente (n = 255)	25.53	5.05	25.01	15.69	47.29
Guarujá (n = 341)	24.61	4.16	24.32	15.43	38.62
Total (n = 1184)	25.34	4.53	24.88	13.27	47.29

sd = standard deviation; Analysis of Variance (ANOVA): $p = 0.002$; Multiple comparisons test: Santos versus São Vicente, $p = 0.664$; Santos versus Guarujá, $p = 0.001$; São Vicente versus Guarujá, $p = 0.014$.

■ **Table 3.** Statistical difference between cities in numbers of domestic's appliances and maids or home helps, numbers of bathrooms and cars.

	Santos vs. São Vicente (p)	Santos vs. Guarujá (p)	São Vicente vs. Guarujá (p)
Radio	0.012	0.001	< 0.001
Vacuum cleaners	< 0.001	< 0.001	< 0.001
Microwaves ovens	< 0.001	< 0.001	< 0.001
Air conditioning units	< 0.001	< 0.001	0.001
Fans	< 0.001	< 0.001	0.001
Computers	0.004	< 0.001	0.001
Televisions sets	0.001	< 0.001	< 0.001
Mean number of maids or home helps	0.004	< 0.001	0.001
Mean number of bathrooms in the home	0.001	0.001	0.181
Numbers of cars	0.039	< 0.001	< 0.001

vs. = versus; p = nonparametric Kruskal-Wallis test.

There were no statistically significant associations between heartburn symptoms and gender ($p = 0.282$), marital status ($p = 0.447$), age group ($p = 0.102$) or number of children ($p = 0.491$), among the patients attended.

■ Discussion

It has been estimated that gastroesophageal reflux disease is the digestive system disease with the highest direct and indirect costs in the United States.¹⁸ Heartburn is the principal symptom of this disease and is present in approximately 89% of the individuals affected by this condition.¹⁹

We prospectively evaluated 1184 adult patients from three different coastal cities using preestablished methodology. We considered that the total number of patients evaluated was acceptable, even though studies with larger samples exist. The study

by Jones and Lydeard²⁰ evaluated 2066 patients who answered a questionnaire and sent it back to the investigator by mail. On the other hand, in the study by Tougas and collaborators²¹ 1036 patients in several Canadian cities were evaluated in person. In this light, we believe that our sample was of significant size. Moreover, in our study, all the interviews were conducted in person and by the same investigator, thereby avoiding differences in evaluation criteria based on subjective interpretation. According to the international literature, although the interview method is more laborious, it certainly furnishes better quality data than from self-applied questionnaires. Interviews avoid the possibility of bias relating to patients concern not to displease their physician.¹⁹

Factors relating to housing conditions provide awareness of how patients live. Although the basic living conditions (electricity, plumbing and

■ Table 4. Education level of head of household.

Education level of head of household	City			Total
	Santos	São Vicente	Guarujá	
	n %	n %	n %	n %
Illiterate / high school not completed	105 17.9	60 23.5	134 39.3	299 25.3
High school completed / elementary education not completed	157 26.7	82 32.2	135 39.6	374 31.6
Elementary education completed / "college" not completed	75 12.8	32 12.5	37 10.9	144 12.2
"College" completed / university-level not completed	128 21.8	54 21.2	19 5.6	201 17.0
University-level completed	109 18.5	20 7.8	13 3.8	142 12.0
Postgraduate level / master's degree / doctorate	14 2.4	7 2.7	3 0.9	24 2.0
Total	588 100.0	255 100.0	341 100.0	1184 100.0

Chi-squared test: $p < 0.001$ *; Chi-squared partition test: Santos ≠ São Vicente ≠ Guarujá.

■ Table 5. Monthly family income in the three cities.

Monthly family income (in minimum monthly salaries)	City			Total
	Santos	São Vicente	Guarujá	
	n %	n %	n %	n %
Up to 2	19 3.2	9 3.5	81 23.8	109 9.2
2 to 4	59 10.0	37 14.5	117 34.3	213 18.0
5 to 9	182 31.0	89 34.9	93 27.3	364 30.7
10 to 20	213 36.2	100 39.2	40 11.7	353 29.8
21 to 34	87 14.8	16 6.3	8 2.3	111 9.4
35 or more	28 4.8	4 1.6	2 0.6	34 2.9
Total	588 100.0	255 100.0	341 100.0	1184 100.0

Kruskal-Wallis test: $p < 0.001$; Multiple comparisons test: Santos versus São Vicente, $p < 0.001$; Santos versus Guarujá, $p < 0.001$; São Vicente versus Guarujá, $p < 0.001$

sewerage) among our patients were good, the number of people living in these homes was high. This may come to be reflected in problems relating to living together day-by-day or in various psychological disorders.

Comparing purchasing power between the three cities it could be seen that the patients from Santos were in a better situation than those from the other two cities. This inference was extrapolated from the patients' domestic equipment ownership and housing characteristics. Other factors, such as education levels (highest in Santos), also affirm for the economic superiority of Santos in relation to São Vicente and of the latter in relation to Guarujá.

There was no statistically significant difference in heartburn prevalence between the genders in the present study. Likewise, there are studies on gastroesophageal reflux that also did not find greater prevalence for one gender or the other.^{22,23} We also did not find any statistical differences regarding race/ethnicity, number of children, marital status or age group. However extrapolating from the typical symptoms of gastroesophageal reflux disease there are studies showing greater prevalence among older age groups and among divorced, separated and widowed patients.²²

The city of Guarujá presented statistical significance regarding the frequency of heartburn symptoms and their interference with activities

■ Table 6. Frequency and extent to which heartburn interfered with habitual activities in the three cities during the month preceding the consultation.

Number of patients		Santos 588 (49.7%)	São Vicente 255 (21.5%)	Guarujá 341 (28.8%)	Total		
Heartburn symptoms	Frequency (per month)	Never	49 (8.3)	33 (12.9)	33 (9.7)	115 (9.7)	A
		Not more than once	112 (19.0)	34 (13.3)	34 (10.0)	180 (15.2)	
		2 to 4 times	98 (16.7)	42 (16.5)	50 (14.7)	190 (16.0)	
		5 to 12 times	130 (22.1)	54 (21.2)	66 (19.4)	250 (21.1)	
		13 to 30 times	199 (33.8)	92 (36.1)	158 (46.3)	449 (37.9)	
	Occurrences of interference	Never	175 (29.8)	86 (33.7)	90 (26.4)	351 (29.6)	B
		Not more than once	108 (18.4)	31 (12.2)	29 (8.5)	168 (14.2)	
		2 to 4 times	50 (8.5)	28 (11.0)	28 (8.2)	106 (9.0)	
		5 to 12 times	108 (18.4)	45 (17.6)	48 (14.1)	201 (17.0)	
		13 to 30 times	147 (25.0)	65 (25.5)	146 (42.8)	358 (30.2)	

A= Kruskal-Wallis test: $p = 0.002$; B= Kruskal-Wallis test: $p < 0.001$.

during the month preceding the consultation. It has been shown that the impairment of quality of life is directly proportional to the severity of the symptoms.^{24,19} According to Nocon and collaborators²⁵ the quality of life is worse among individuals with nocturnal heartburn.

We observed that the patients in lower socioeconomic situations presented greater frequency of heartburn that interfered in their daily activities. A study by Nouraie and collaborators²⁶ showed that there was no greater prevalence of gastroesophageal reflux disease in relation to any education level among patients. On the other hand, another study showed an inverse relationship between educational level and the presence of gastroesophageal reflux.¹⁶ However, the patients in those studies were evaluated in relation to gastroesophageal reflux disease, rather than the symptom of heartburn. Hence, our finding differed from these other studies, in that the lower the education level was, the greater the prevalence of heartburn symptoms.

We also found in our study that the patients from Guarujá presented statistically significant lower body mass index than that of patients from Santos and São Vicente. It is known that heartburn may be a consequence of acid reflux from the stomach to the esophagus but several other causes that trigger these symptoms have been implicated. Chemical or mechanical stimulation as well as hyperalgesia may cause the symptom.²

Our study made us aware of several factors that might interfere with the approach taken and

therapeutic success among patients with heartburn. We emphasize that heartburn is closely related to the economic situation of the patients. This directly reflects how the patient reacts to heartburn eventually exacerbating the symptom. It is important to evaluate patients with heartburn beyond the medical history placing importance on the environment within which they live.

It was observed that heartburn in patients without gastroesophageal reflux disease present etiopathogenic factors triggering the symptom that are more complex than those in patients with gastroesophageal disease. Some of these patients may already present non-erosive esophagitis or even functional heartburn a clinical condition compatible with gastroesophageal reflux disease. What may be of greater importance is that these patients may present the symptom before developing gastroesophageal reflux disease. Further studies should be conducted with this aim and in order to achieve greater understanding of heartburn with and without gastroesophageal reflux. Knowledge of the epidemiology and risk factors for heartburn within a region is the first step towards formulating prevention and treatment strategies.

■ Conclusions

The presence of heartburn was directly related to the low socioeconomic conditions of the city in which the patients lived. The prevalence and severity of heartburn were unrelated to gender, marital

status, race/ethnicity, age or number of children. The less favored social class evaluated by a variety of socioeconomic factors presented greater incidence of heartburn than did the more favored social class.

References

- Nocon M, Labenz J, Willich SN. Lifestyle factors and symptoms of gastroesophageal reflux: a population-based study. *Aliment Pharmacol Ther* 2006;23:169-174.
- Locke GR, Talley NJ, Fett SL, et al. Prevalence and clinical spectrum of gastroesophageal reflux: a population based study in Olmsted County, Minnesota. *Gastroenterology* 1997;112:1448-1456.
- Moraes-Filho JPP, Chinzon D, Eisig JN, et al. Prevalence of heartburn and gastroesophageal reflux disease in the urban Brazilian population. *Arq Gastroenterol* 2005;42:122-127.
- Dent J, El-Serag HB, Wallander MA, et al. Epidemiology of gastro-oesophageal reflux disease: a systematic review. *Gut* 2005;54:710-717.
- Mohammed I, Nightingale P, Trudgill NJ. Risk factors for gastro-oesophageal reflux disease symptoms: a community study. *Aliment Pharmacol Ther* 2005;21:821-827.
- Navarro-Rodriguez T, Hashimoto CL, Carrilho FJ, et al. Reduction of abdominal pressure in patients with ascites reduces gastroesophageal reflux. *Dis Esophagus* 2003;16:77-82.
- Ang D, Sifrim D, Tack J. Mechanisms of heartburn. *Nat Clin Pract Gastroenterol Hepatol* 2008;5:383-392.
- Bobak M, Hertzman C, Skodova Z, et al. Socioeconomic status and cardiovascular risk factors in the Czech Republic. *Int J Epidemiol* 1999;28:46-52.
- Merkin SS, Coresh J, Roux AV, et al. Area socioeconomic status and progressive CKD: the atherosclerosis risk in communities (ARIC) study. *Am J Kidney Dis* 2005;46:203-13.
- Jansson C, Nordenstedt H, Johansson S, et al. Relation between gastroesophageal reflux symptoms and socioeconomic factors: a population-based study (the HUNT study). *Clin Gastroenterol Hepatol* 2007;5:1029-1034.
- Hagen K, Vatten L, Stovner LJ, et al. Low socio-economic status is associated with increased risk of frequent headache: a prospective study of 22718 adults in Norway. *Cephalalgia* 2002;22:672-9.
- Zhou G, Liu X, Xu G, et al. The effect of socioeconomic status on three-year mortality after first-ever ischemic stroke in Nanjing, China. *BMC Public Health* 2006;11:227-233.
- Adler NE, Ostrove JM. Socioeconomic status and health: what we know and what we don't. *Ann N Y Acad Sci* 1999;896:3-15.
- Isaacs SL, Schroeder SA. Class: the ignored determinant of the nation's health. *N Engl J Med* 1999;351:1137-1142.
- Marshall B, Chevalier A, Garillon C, et al. Socioeconomic status, social mobility and cancer occurrence during working life: a case-control study among French electricity and gas worker. *Cancer Cause Control* 1999;10:495-502.
- Dore MP, Maragkoudakis E, Fraley K, et al. Diet, lifestyle and gender in gastro-oesophageal reflux disease. *Dig Dis Sci* 2008;53:2027-32.
- Moraes-Filho JPP, Ceconello I, Gama-Rodrigues J, et al. Brazilian consensus on gastroesophageal reflux disease: proposals for assessment, classification, and management. *Am J Gastroenterol* 2002;97:241-248.
- Sandler RS, Everhart JE, Donowitz M, et al. The burden of selected digestive disease in the United States. *Gastroenterology* 2002;122:1500-11.
- Pereira GIN, Costa CDS, Geocze L. Tradução e validação para a língua portuguesa (Brasil) de instrumentos específicos para a avaliação de qualidade de vida na doença do refluxo gastroesofágico. *Arq Gastroenterol* 2007;44:168-177.
- Jones R, Lydeard S. Prevalence of symptoms of dyspepsia in the community. *BMJ* 1989; 298: 30-32.
- Tougas G, Chen Y, Hwang P, et al. Prevalence and Impact of upper gastrointestinal symptoms in the Canadian population: findings from the DIGEST study. *Am J Gastroenterol* 1999;94: 2845-2854.
- Chen M, Xiong L, Chen H, et al. Prevalence, risk factors and impact of gastroesophageal reflux disease symptoms: a population-based study in South China. *Scand J Gastroenterol* 2005;40:759-67.
- Nouriae M, Razjouyan H, Assady M, et al. Epidemiology of gastroesophageal reflux symptoms in Tehran, Iran: a population-based telephone survey. *Arch Iran Med* 2007;10:289-94.
- Eslick GD, Talley NJ. Gastroesophageal reflux disease (GERD): risk factors, and impact on quality of life- a population-based study. *J Clin Gastroenterol* 2009;43:111-7.
- Nocon M, Labenz J, Jaspersen D, et al. Health-related quality of life in patients with gastro-oesophageal reflux disease under routine care: 5-year follow-up of the ProGERD study. *Aliment Pharmacol Ther* 2009;29:662-8.
- Nouriae M, Radmard AR, Zaei-Rezaili H, et al. Hygiene could affect GERD prevalence independently: a population-based study in Tehran. *Am J Gastroenterol* 2007;102:1353-60.