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Cost of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama

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Costs of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama

by

Nydia Flores Chiari

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Science in Public Health
Department of Environmental and Occupational Health
College of Public Health
University of South Florida

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wheezing, Social Security Fund

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DEDICATION

I want to dedicate this victory to my mom Vielka, my husband Oriviades, my sister Dagmar, my brother-in-law Osmond, and my nieces and nephew Daniella, Leslie and Diego. Without your economic and emotional support, and without the time devoted to the care of Sarita, this dream would have been more difficult to achieve and the sacrifice of being separated from you almost impossible to bear.

To my grandfather Adolfo - even though your mind is no longer with us, you never doubted my abilities.

To my angels in heaven, Simon and Nidia, who always believed in me and because I'm sure they were very proud of this new achievement.

To my precious daughter Sara Vanessa, because at your young age you could understand the reason for our separation without ever reproaching me, and for being the motor that drives my desire to succeed, I love you my princess!

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TABLE OF CONTENTS

LIST OF TABLES	iii
LIST OF FIGURES	v
ABSTRACT.....	vi
CHAPTER ONE: INTRODUCTION.....	1
Definition of Asthma	1
Geography and Demography of Panama	1
Panama Climate	3
Panama Health System	4
Social Security Fund.....	4
Description.....	4
Demography of the insured.....	5
Sources of funds.....	6
Benefits.....	7
CHAPTER TWO: LITERATURE REVIEW	9
Treatment Cost and Epidemiology of Asthma.....	9
Causes of Asthma and Asthma Attacks	10
Types of Asthma Attacks	12
Mild attack.....	13
Moderate attack.....	13
Severe attack.....	13
CHAPTER THREE: METHODOLOGY	15
Research Questions.....	15
Data Collection	15
CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND INTERPRETATION OF RESULTS	19
Overall Average Cost for Treatment of Asthma Attacks in Children at the Tertiary Level of Healthcare within the CSS Hospital System.....	19
Variation of the Average Cost for Treatment of Asthma Attacks Among Children Treated at the Tertiary Level of Healthcare	21
The child's sociodemographic variables (gender, age, area of residence).....	21
Season.....	23
Referral from a lower level of healthcare facility.....	24
Treatment in the emergency department or hospitalization or both.....	24

Type of treatment received.....	25
Asthma Attack Statistics Among Children Treated at the Tertiary Level of Healthcare in the Republic of Panama.....	27
CHAPTER FIVE: DISCUSSION.....	33
Limitations	34
Recommendations.....	35
REFERENCES	37
APPENDIX A: ADDITIONAL TABLES.....	39
APPENDIX B: ADDITIONAL FIGURES	45

LIST OF TABLES

Table 1: New Enrollments of Dependent of Active Insured at the Republic of Panama, by Type, Years 2006-2010	6
Table 2: Total Treatment Cost by Severity of Asthma	20
Table 3: Average Cost of Treatment per Severity by Gender.....	21
Table 4: Average Cost of Treatment per Severity by Age range.....	22
Table 5: Average Cost of Treatment per Severity by Districts.....	22
Table 6: Average Cost of Treatment per Severity by Season	23
Table 7: Average Cost of Treatment per Severity by Referred	24
Table 8: Average Cost of Treatment per Severity by Area of Consultation.....	25
Table 9: Average Cost of Treatment per Severity by Treatment Intensity.....	26
Table A1: Random Number Table.....	40
Table A2: Oxygen and Hospitalization Costs.....	41
Table A3: Other Costs	42

Table A4: Codebook43

Table A5: Data Log44

LIST OF FIGURES

Figure 1:	Panama Map	2
Figure 2:	Population Covered by the Social Security Fund by Type, Republic of Panama, Years 2006-2010.....	5
Figure 3:	Department of Medical Records and Health Statistics.....	16
Figure 4:	Asthma Attack Cases According to Severity of Asthma.....	20
Figure 5:	Percentage of Asthma Attack Cases by Gender	27
Figure 6:	Frequency of Asthma Attacks per District in the Study Sample during January to June 2012 at the <i>Hospital de Especialidades Pediatricas</i>	28
Figure 7:	Frequency of Asthma Attacks per Township in the Study Sample during January to June 2012 at the <i>Hospital de Especialidades Pediatricas</i>	29
Figure 8:	Percentage of Asthma Attacks by Age Range.....	30
Figure 9:	Percentage of Asthma Attacks by Season	31
Figure 10:	Comorbidities	32
Figure B1:	USF IRB Approval	46
Figure B2:	HEPOTH IRB Approval (English version)	47

ABSTRACT

Asthma is a chronic respiratory disease characterized by inflammation of the airway and the presence of recurrent attacks (exacerbations) of breathlessness, wheezing, cough, chest tightness, or some combination of these symptoms. In the US, about 53% of people with asthma had an asthma attack in 2008, and 57% of these, were children. One in ten children (10%) had asthma in 2009, and boys were more likely than girls to have asthma. Internationally, the prevalence of asthma varies widely in different countries, but the disparity is narrowing due to rising prevalence in low and middle income countries. Unfortunately, we do not have statistics for asthma in the Republic of Panama, neither epidemiological data nor costs, which is the reason why this research is needed.

The Panamanian Social Security Fund (CSS) provides protection to workers, their immediate families and the pensioned. By the end of 2010, the total insured population was 2,862,202 (83% of the total population of Panama). Of the total insured population 58% were dependent. Of this, 1,205,607 (42%) were children. On the basis of this information, we decided to develop the research study using information from the CSS, specifically in the *Hospital de Especialidades Pediátricas* (HEPOTH). It is the only tertiary level of healthcare children's hospital of the CSS.

A quantitative-descriptive design was used to develop this study. Data was collected from medical records of patients diagnosed with asthma in the HEPOTH from January to June 2012. We reviewed the medical records of each care area by month, and numbered each clinical record of children diagnosed with asthma in crisis and randomly

selected 10% of the medical records from a minimum of 2000 records. Information on treatment costs was also obtained. Once all the information was collected, it was typed in the digital data log created for this study and the responses were code converted and the information was entered into a database. The data were exported to IBM SPSS Statistics 21.

The average cost of asthma attacks in Panama is estimated at \$205.52. We were able to confirm that there are variations in this average by gender, age, geographic area of residence, season, severity, whether treated in the emergency department or hospitalization, and the type of treatment received. It was also possible to obtain secondary information about the epidemiology of asthma that allowed us to confirm that our statistics matched international statistics.

CHAPTER ONE: INTRODUCTION

Definition of Asthma

Asthma is a chronic respiratory disease characterized by inflammation or hyper reaction of the airway and the presence of recurrent attacks (exacerbations) of breathlessness, wheezing, cough, chest tightness, or some combination of these symptoms (Global Initiative for Asthma [GINA], 2012) which vary in severity and frequency from person to person. It attacks all age groups but often starts in childhood. In an individual, attacks may occur from hour to hour and day to day (World Health Organization [WHO], 2012).

Unfortunately, the Republic of Panama does not have national statistics of asthma, neither epidemiological data nor treatment cost estimates. According to the local statistics of the *Hospital de Especialidades Pediátricas “Omar Torrijos Herrera”* (HEPOTH), the primary reason for visiting the emergency department during 2011 was Asthma Attacks (Social Security Fund, 2012), which is the reason why research on the prevalence of asthma attacks and costs of treatment is needed.

Geography and Demography of Panama

In an indigenous language, Panama means “Abundance of fishes and butterflies.” The Isthmus of Panama is located in Central America, on the narrowest part, and it links North America and South America (Figure 1). This isthmus is S-shaped and is slightly smaller than South Carolina. Panama is approximately 77,082 square kilometers in size:

772 kilometers in length, and between 60 and 177 kilometers in width (U.S. Library of Congress, 2012).

Figure 1. Panama Map



Figure 1. From World Travel Guide (2012), Panama Map, Columbus Travel Media, LTD

Instead of calling the coasts of Panama the north coast and south coast, they are known as the Caribbean (or Atlantic) and Pacific coasts. To the east of Panama is Colombia and to the west Costa Rica. Panama is divided into nine provinces: Bocas del Toro, Coclé, Colón, Chiriquí, Darién, Herrera, Los Santos, Panama (where the capital is located) and Veraguas; and five indigenous regions: Kuna Yala, Embera Wounan, Kuna de Madungandi, Kuna de Wargandi and Gnobe Bugle (Ministry of Tourism of Panama, 2012). In this study, the asthma attacks will be analyzed by districts and townships in some of these provinces.

Many languages, including seven indigenous languages, are spoken in Panama, although Spanish is the official and dominant language. English is sometimes spoken by many professionals and those working in the business or governmental sectors of society.

Panama's 2011 population is estimated at more than 3,460,463, and more than half the population lives in the Panama City-Colon metropolitan corridor (Ministry of Tourism of Panama, 2012).

Panama Climate

Panama has a warm and wet tropical climate and does not experience seasons characterized by changes in temperature like most of the countries that are also distant from the equator, but has a rainy season and a dry season (Smithsonian Tropical Research Institute, 2013). The dry season usually starts in mid-December with variations of three to four weeks. At this time, strong winds from the northeast known as *alisios* (winds) begin to blow. During the day temperatures increase slightly to around 30-31°C (86-88°F), but at night they drop to around 22-23°C (72-73°F). The relative humidity decreases throughout the season, reaching average values of 70% (Smithsonian Tropical Research Institute, 2013).

The rainy season begins around May 1 (+/- 1-2 weeks). May is generally the wettest month, especially in the Panama Canal area, so that the transition between the extremely dry conditions at the end of the dry season and the beginning of the rainy season can be very dramatic. With the arrival of the rains, temperatures drop slightly during the day and *alisios* winds disappear. The relative humidity increases rapidly and may be between 90% and 100% throughout the season (Smithsonian Tropical Research Institute, 2013). On this study, asthma attacks will be analyzed by the three periods in the year: dry, transitional and wet, because climate is considered one factor that contributes to the exacerbation of the disease.

Panama Health System

Panama's Health System consists of all the nursing homes, public welfare organizations, hospitals and health clinics in Panama. It consists of both state and privately managed hospitals. The country's public health sector is administered by two separate entities: Ministry of Health (MINSa) and the Social Security Fund (CSS) (International Federation of Medical Student's Association [IFMSA], 2012).

The Ministry of Health is in charge of the National Health System. MINSa serves as the health authority, formulating policies and regulating health care activity, and is one of the major health services providers. The programs offered include hospital and clinic building, nutrition services, "free of charge" health assessments and medical care for the uninsured, health education, and sanitation check-up. The primary healthcare centers and hospitals managed by MINSa receive funding from the General Budget of the Government of the Republic of Panama (Ministry of Health, 1969). Those managed by CSS are funded with contributions from the workers' salaries (Social Security Fund, 2005). In 2010 the CSS had more than 80% (2.8 million) of the population insured. The remaining 20% uninsured receive services from the MINSa network (National Institute of Statistic and Census, 2011).

Social Security Fund

Description.

The Social Security Fund (CSS) was founded in 1941. Its first aim was to protect permanent workers and cover them for maternity, sickness, old age and disability. Employees of the public and private sectors, and domestic services are covered. Those who work independently can make voluntary payments for health coverage. Foreign

workers are covered under this system if they are working for a company based in Panama. Those who are not eligible for coverage include international business employers on a contract issued in another country, agricultural workers employed for less than three months a year, or family labor (Social Security Fund, 2005).

Demography of the insured.

By the end of 2010, the total insured population was 2,862,202 (83% of the total population of Panama). Of the total insured population, 58% were dependent. Of them, 1,205,607 (42%) were children (National Institute of Statistic and Census, 2011) (Figure 1).

Figure 2. Population Covered by the Social Security Fund by Type, Republic of Panama, Years 2006-2010

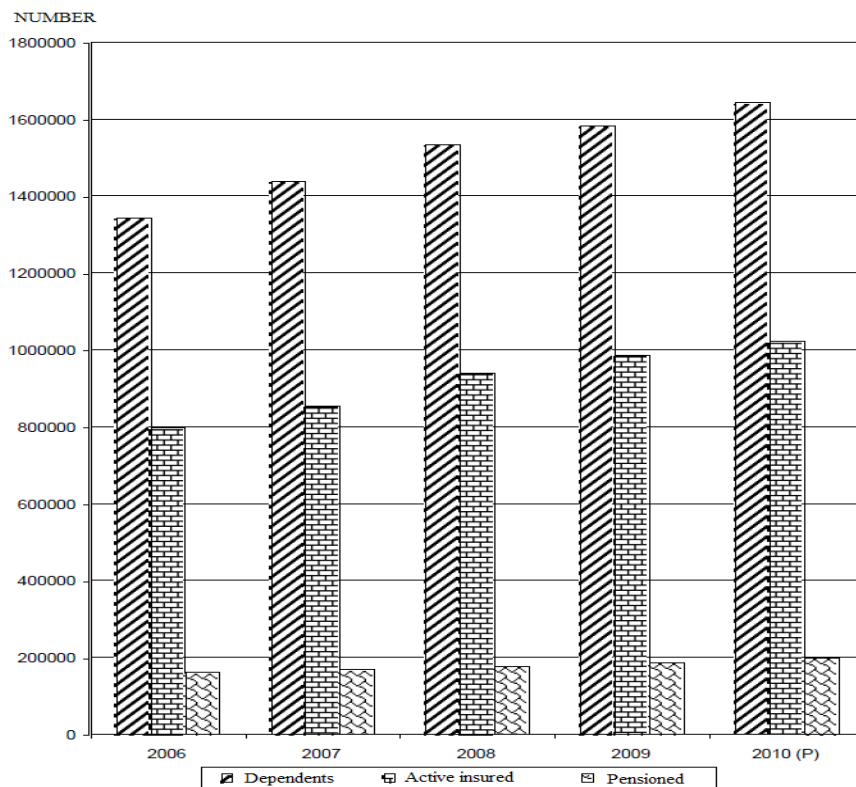


Figure 2. Translated from the source: General Comptroller of the Republic of Panama, National Institute of Statistics and Census, Panama en Cifras: Años 2006-10, Panama 2011.

During 2010, 30,620 were enrolled as new contributors. Of those, 70% were registered in Panama City. There were also 94,631 enrollments of dependents, 77% of whom were children (Table 1).

Table 1. New Enrollment of Dependents of Active Insured at the Republic of Panama, by Type, Years 2006-2010

Year	NEW ENROLLMENTS OF DEPENDENTS OF ACTIVE INSURED				
	Total	TYPE OF DEPENDENTS			
		CHILD	WIFE	DISABLED SPOUSE	FATHER OR MOTHER
2006.....	79,971	60,862	11,151	14	7,944
2007.....	79,006	59,933	10,827	27	8,219
2008.....	85,500	65,485	9,996	28	9,991
2009.....	91,641	70,178	10,809	43	10,611
2010 (P).....	94,631	72,910	9,956	9	11,756

Note. Translated from the source: General Comptroller of the Republic of Panama(2011), National Institute of Statistics and Census, Panama en Cifras: Años 2006-10, Panama.

On the basis of this information, we decided to develop this research study using information from the Social Security Fund, specifically in the *Hospital de Especialidades Pediatricas*. It is the only tertiary level of healthcare children’s hospital of the CSS.

Sources of funds.

Social Security System funds are generated from contributions by the government, the employees and the employers (Social Security Fund, 2005) as follows:

- Employees make mandatory payments of 9.75% of monthly gross earnings.
There are no charges for dependents.
- Employers make mandatory payments of 12.25% of monthly gross payroll.
The employer's contributions also finance maternity and sickness benefits.
- Self-employed persons make voluntary contributions of 13.5% of declared earnings.
- The government contributes: 0.8% of earnings, declared earnings, and state pensions paid to pensioners; the earnings of a tax intended on beverages and tobacco; a subsidy of \$20.5 million a year; and 10% of income received from optical fiber concessions. Government contributions also finance maternity and sickness benefits.

Benefits.

Healthcare benefits from the CSS include general and specialist care, maternity care, dental care, hospitalization, surgery, laboratory services and medicines. Generally, medical services are provided in the CSS facilities or in the facilities of MINSA, with the CSS paying for those services. In some special cases, including those in which neither the CSS nor MINSA have the service needed, the cost of private care obtained in the country or abroad can be refunded in part or in its entirety, with permission from CSS. There is no limit on the coverage if the medical service is considered necessary (Social Security Fund, 2005).

Benefits are provided to the insured's wife and children younger than age 18 (age 25 if a student or disabled), a dependent mother, a disabled father, or parents older than age 60 (Social Security Fund, 2005).

For healthcare, dependents do not pay any extra amount of money or receive billing for received services. That is why, despite the use of a system for estimating costs (COST-20), this data is used for general costs and no specific data can be obtained on the cost for each individual case.

CHAPTER TWO: LITERATURE REVIEW

Treatment Cost and Epidemiology of Asthma

Asthma is a chronic inflammatory disease of the lung characterized by recurrent breathing problems. According to recent estimates, asthma affects 300 million people worldwide and one in twelve people (about 25 million) in the United States in 2009 (CDC, 2011). Asthma is a problem that has become a major public health issue in developing countries. It can occur at any age and ethnicity, however, it often begins in childhood. In fact, between 2008 and 2010 the prevalence of asthma was higher among boys (World Allergy Organization [WAO], 2011). In the U.S., one in ten children (10%) suffered from asthma in 2009, and boys were more likely than girls to suffer from the disease (CDC, 2011). About 53% of people with asthma suffered an asthma attack in 2008 and of these 57% were children (CDC, 2011).

About 255,000 people worldwide die each year from asthma cases. Medical costs for asthma in the U.S. were \$3,300 per person per year from 2002 to 2007 (CDC, 2011). Consultations in primary care for asthma per 100 persons in the U.S. declined from 2001 to 2009, while emergency room visits and hospitalization for asthma remained stable (CDC, 2012). Compared with adults, children had higher rates of primary care and emergency department visits for asthma while hospitalization rates were similar, and lower mortality rates (CDC, 2012).

At the international level the prevalence of asthma varies greatly in different countries, but the gap is shrinking due to increased prevalence in countries of low and

middle income (World Allergy Organization [WAO], 2011). As mentioned, it is estimated that 300 million people worldwide suffer from asthma, and it is estimated that the number of people with asthma will grow by more than 100 million in 2025 (World Health Organization [WHO], 2007). The rapid increase in asthma worldwide is one of the biggest mysteries of modern medicine. The most significant increases have occurred in Australia where about a quarter of children are diagnosed with asthma (Medcenter, 2013).

Causes of Asthma and Asthma Attacks

Asthma is the most common chronic disease among children worldwide, especially children with low birth weight, children exposed to cigarette smoke, children who are black, and children raised in a low income environment. Most children have their first symptoms before the age of five years and usually begin with frequent episodes of wheezing and respiratory infections (National Institute of Health, 2012). Young boys are more likely to develop asthma than young girls, but this trend is reversed during adulthood. This is likely because the airway in boys has a smaller diameter than that of girls which produces a greater risk to wheezing after viral infection (National Institute of Health, 2012).

It is not known exactly what causes asthma. Researchers believe that genetic and environmental factors interact to cause asthma, usually in the first years of life. These factors are (National Institute of Health, 2012):

- Inherited tendency to develop allergies
- Father or mother with asthma
- Some childhood respiratory infections

- Contact with allergens that are transported by air or exposure to some viral infections in the first months or years of life, when the immune system is developing

In most cases, asthma is caused by inhalation of an allergen, so it is important to determine which allergen or irritant is causing asthma. Among the inhaled allergens that can cause asthma attacks are (Medcenter, 2013):

- the hair of animals like dogs, cats, horses,
- pollen from flowers,
- chemicals, gases, or particulates of industrial materials,
- cigarette smoke,
- pollutants expelled by cars, and
- dust mites.

Besides the above factors, other important factors that produce exacerbations in some asthmatics are:

- Inhalation of cold air
- Exhaustion from physical exercises
- Stress or anxiety
- Hyperventilation
- Certain drugs (eg. aspirin and some remedies for hypertension blood)
- Some chemicals, heavy perfumes and aerosol sprays
- Hypoglycemia
- Respiratory infections (bronchitis, flu)
- Intense emotions

Asthma symptoms vary according to the contribution of each of these factors in each patient and over time. They are often worse at night and in the early hours of the morning. Some patients have occasional symptoms (eg. after strenuous exercise), others have symptoms that interfere with daily life, others have a very severe disease that excludes most normal school activities and work. If the family has asthma or atopy (predisposition that causes an immediate hypersensitivity reactions against common environmental antigens), exposure to irritants (eg, cigarette smoke) could cause the airways to react more strongly to substances in the air (National Institute of Health, 2012).

Types of Asthma Attacks

Asthmatic attacks consist of an increased intensity of bronchial obstruction and are usually detected by an increase in patient discomfort or a decreased drug effect at the time of an attack. They often occur gradually over several days, but can be abrupt, and take place over a period of minutes. The improvement of the crisis can also be gradual. Often there is an increase in bronchial reactivity during these exacerbations (Moreno Bolton & Alvarez Vera, 1995).

Asthma attacks often occur mainly in the spring and autumn or during adverse weather conditions. Even a few storms and cold air can cause an attack (Medcenter, 2013). If left untreated, an asthma attack can last several hours or even several days. Rescue medications for asthma (or quick relief) often make symptoms remit fairly quickly, and most people feel much better as the crisis abates, although sometimes they have to spend several days to recover completely (Moreno Bolton & Alvarez Vera, 1995).

Asthma attacks are classified mild, moderate or severe according to their signs and symptoms (Moreno Bolton & Alvarez Vera, 1995).

Mild attack.

Mild attacks are characterized by an increase in the intensity of the problems that do not yield to the usual treatment and a limit to intensive physical labor. Patients feel a little shortness of breath at rest, can talk without difficulty, can lie flat with no clear increasing breathlessness, and are awake. The PEF (peak expiratory flow) measured by spirometry, is between 70% and a normal value determined by standardized Age-height-gender table (Moreno Bolton & Alvarez Vera, 1995).

Moderate attack.

Moderate attacks are characterized by an increase in the intensity of the problems that do not yield to the usual treatment and limit the possibility of medium-intensity physical labor. Patients prefer to be at rest for respiratory distress and find it difficult to complete a sentence or sleep. The patient is also considered to have a moderate attack if a mild attack is not relieved after an hour, or if discomfort reappears within a few hours. The PEF for a moderate attack is predicted to be between 50 and 70% according to values in the standardized normal values table (Moreno Bolton & Alvarez Vera, 1995).

Severe Attack.

In severe attacks, the patient has difficulty breathing at rest, can only say a few words, must sit leaning on his/her hands and has blue lips or fingernails (due to a lack of oxygen). It is also considered a serious attack if a moderate attack is not relieved after six

hours or if the discomforts reappear within a few hours. The PEF for a severe attack is predicted to be below 50% according to values in the standardized normal values table (Moreno Bolton & Alvarez Vera, 1995).

CHAPTER THREE: METHODOLOGY

Research Questions

The present study was undertaken in order to answer the following questions:

1. What is the overall average cost for treatment of asthma attacks in children at the tertiary level of healthcare within the Panamanian CSS hospital system?
2. Does the average cost for treatment of asthma attacks among Panamanian children treated at the tertiary level of healthcare vary by:
 - a. the child's sociodemographic variables (gender, age, area of residence),
 - b. season,
 - c. referral from a lower level health care facility,
 - d. severity of asthma,
 - e. treatment in the emergency department or hospitalization or both, or
 - f. type of treatment received?
3. Are the asthma attack statistics among children treated at the tertiary level of healthcare in the Republic of Panama similar to or different from observed international statistics?

Data Collection

A quantitative-descriptive design was used to develop this study. The National Executive Director of Health Services and Benefits of the Social Security Fund gave the administrative approval for the study to be developed in the *Hospital de Especialidades*

Pediatricas. The study was also approved by the University of South Florida Institutional Review Board (USF IRB) in Tampa, Florida, and the HEPOTH Research Bioethics Committee in Panama City, Republic of Panama.

Once approvals were received, we formally requested authorization from the HEPOTH Medical Directorate, which directs the Department of Teaching, to inform the departments involved in the study to provide the required assistance. Once the departments involved were notified, a meeting was held to organize the collection of data. During the meeting it was determined that the Department of Medical Records and Health Statistics (REGES) had the means to locate the necessary records for all care areas of the hospital. The Statistics Section of the REGES Department maintains paper records by month and care area with paper copies of the admission/discharge record of patients. Also, the ER records are archived by month (Figure 3).

Figure 3. Department of Medical Records and Health Statistics



Figure 3. Location of the ER and Observation room medical records at the Statistic Section of the REGES Department.

As a first step, records by month and care area were located and separated: Emergency Department, observation area and hospitalization rooms. The Republic of Panama does not have statistics on asthma attacks among children treated at any level of

care (primary, secondary and tertiary). Therefore, for this study, intentional sampling techniques were used (Babbie, 2008) for randomly selecting 10% of the medical records from a minimum of 2000 records. I reviewed the medical records of each care area by month, and numbered each clinical record of children diagnosed with asthma in crisis, exacerbated asthma or acute asthma with or without comorbidities. I excluded diagnoses of asthma history, infant asthma, reversible wheezing bronchitis, bronchiolitis and bronchial hyperreactivity. I reviewed the records from January to June 15, 2012, at which point there were already 2050 records, so I proceeded to the randomization of the 2050 records. For the 205 randomly selected medical records that were analyzed, I used a random number generator (Appendix A1). Once I obtained and printed the list of 205 randomly selected numbers, I proceeded to locate medical records corresponding to each selected number. During this part of the process, whenever the hospital staff could not locate the randomly selected record, the next one in sequence was used.

With the 205 records ready, I proceeded to the collection of data: date of care, sex, age, area of residence (district and township), whether the patient was treated in the Emergency Department, observation room or hospitalization room, whether the patient was referred from a lower level of health care facility, asthma severity (based on signs and symptoms), attending physician category, type of treatment received, and comorbidities. All information was recorded manually in the data record as it was being collected. No information that permits identification of any patient, such as name, identification number or social security number, or the exact address was required for this study and therefore was not collected.

To obtain information on costs, I met with the staff in the Cost Section who provided the cost of: bed days for observation room and internal medicine and

pneumology rooms (Appendix A2), consultation of the physicians at the emergency department, the internal medicine and the pneumology rooms, the treatments and medications (inhalers, intravenous solutions and medications, nebulization solutions, oral medications), oxygen, respiratory therapy, laboratory, x-rays and transfers (Appendix A3). Because there is no information about the individual costs of each patient, information was matched from each file in each case with the costs entailed. In each case the total cost of treatment was calculated by adding the monetary values for all the prescribed treatment each patient received.

Once all the information was collected, it was typed in the digital data log created for this study (Appendix A5). For a better analysis of the data, the date of medical treatment/attention was divided into three groups according to whether it corresponds to the dry season, transitional season or wet season. Age was grouped into three ranges: 0-4 years, 5-9 years, and 10-14 years and the costs were averaged according to the severity of asthma. After data entry, and prior the development of a codebook to convert numeric variables, responses were code converted and the information was typed encoded in the database (Appendix A4). The table was exported to IBM SPSS Statistics 21, the statistical analysis system chosen for this study.

CHAPTER FOUR: DATA ANALYSIS, FINDINGS AND INTERPRETATION OF RESULTS

Once the database was created, it was exported to IBM SPSS Statistics 21 for statistical analysis. This chapter is intended to present the results of the statistical analysis and to determine the cost for treatment of asthma attacks in children at the tertiary level of healthcare and to answer the other research questions. To follow a logical sequence with respect to the research questions, we will present the analysis and results in the order in which the questions were listed.

Overall Average Cost for Treatment of Asthma Attacks in Children at the Tertiary Level of Healthcare within the Panamanian CSS Hospital System

The average cost of treating asthma attacks was obtained from information gathered from the Cost Section at the *Hospital de Especialidades Pediatricas* by calculating the statistical mean of the total cost of treatment for each level of severity of asthma. So, as can be seeing in Table 2 which displays cost estimates by severity, for a mild asthma attack the cost is \$90.51, for a moderate asthma attack the cost is \$369.50, and for a severe asthma attack the cost is \$1,509.09. These figures yield an average total cost of \$205.52 which is less than the means for moderate and severe attacks. However, Figure 4 shows that the percentage of mild cases in the study sample is about 70%, which is why the average total cost of asthma attacks is \$205.52.

Table 2. Total Treatment Cost by Severity of Asthma

Severity of asthma	Mean	N	Std. Deviation
Mild	\$90.51	145	\$139.860
Moderate	\$369.50	54	\$419.073
Severe	\$1,509.09	6	\$387.435
Average Cost	\$205.52	205	\$360.019

Figure 4. Percentage of Asthma Attack Cases According to Severity of Asthma

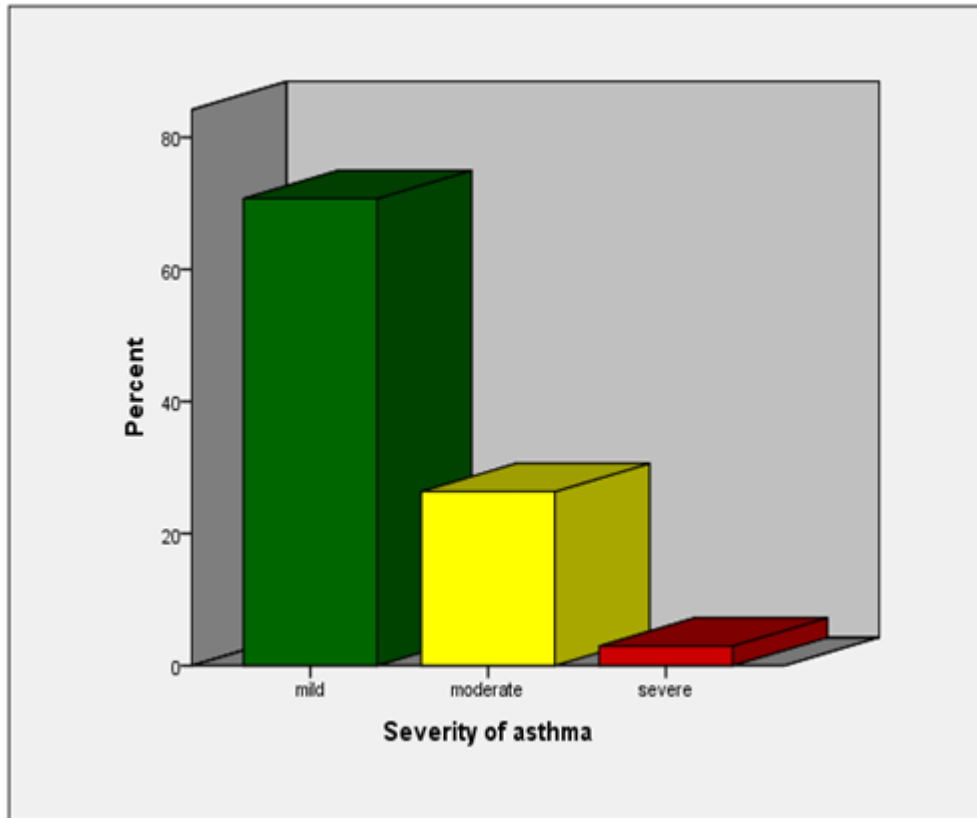


Figure 4. Source: SPSS chart of the descriptive analysis of the study: Costs of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama

Variation of the Average Cost for Treatment of Asthma Attacks Among Panamanian Children Treated at the Tertiary Level of Healthcare

The child’s sociodemographic variables (gender, age, area of residence).

Tables 3, 4 and 5 show the differences between the average cost of asthma treatment according to sex, age and district of residence.

Table 3. Average Cost of Treatment per Severity by Gender

Gender	Severity of asthma	Mean	N	Std. Deviation
Male	mild	\$90.51	82	\$0.000
	moderate	\$369.50	27	\$0.000
	severe	\$1,509.09	3	\$0.000
	Male Average Cost	\$195.76	112	\$249.285
Female	mild	\$90.51	63	\$0.000
	moderate	\$369.50	27	\$0.000
	severe	\$1,509.09	3	\$0.000
	Female Average Cost	\$217.27	93	\$268.741

Table 4. Average Cost of Treatment per Severity by Age Range

Age Range	Severity of asthma	Mean	N	Std. Deviation
0-4 yrs	mild	\$90.51	99	\$0.000
	moderate	\$369.50	40	\$0.000
	severe	\$1,509.09	5	\$0.000
	0-4 yrs Average Cost	\$217.26	144	\$275.601
5-9 yrs	mild	\$90.51	32	\$0.000
	moderate	\$369.50	11	\$0.000
	5-9 yrs Average Cost	\$161.88	43	\$123.169
10-14 yrs	mild	\$90.51	14	\$0.000
	moderate	\$369.50	3	\$0.000
	severe	\$1,509.09	1	.
	10-14 yrs Average Cost	\$215.82	18	\$339.830

Table 5. Average Cost of Treatment per Severity by Districts

Districts	Severity of asthma	Mean	N	Std. Deviation
Arraijan	mild	\$90.51	13	\$0.000
	moderate	\$369.50	5	\$0.000
	severe	\$1,509.09	2	\$0.000
	Average Cost	\$302.12	20	\$430.323
San Miguelito	mild	\$90.51	26	\$0.000
	moderate	\$369.50	8	\$0.000
	severe	\$1,509.09	2	\$0.000
	Average Cost	\$231.32	36	\$335.246
Panama	mild	\$90.51	13	\$0.000
	moderate	\$369.50	5	\$0.000
	severe	\$1,509.09	2	.
	Average Cost	\$179.09	20	\$168.675
Chorrera	mild	\$90.51	3	\$0.000
	moderate	\$369.50	1	.
	Average Cost	\$160.26	4	\$139.495
Other	mild	\$90.51	1	.
	severe	\$1,509.09	1	.
	Average Cost	\$799.80	2	\$1,003.088

We can see that the average cost of treatment is highest in female patients in the 0 to 4 years age range and living outside of the Province of Panama (other). This age group has the highest prevalence of attacks. This is followed by boys, with ages ranging from 10 to 14, and living in the District of San Miguelito.

Season.

Table 6 shows that during the dry season the average cost of an asthma attack is \$231.08, at the transition it is \$168.82, and during the wet season it is \$186.58.

Table 6. Average Cost of Treatment per Severity by Season

Season	Severity of asthma	Mean	N	Std. Deviation
Dry season	mild	\$90.51	75	\$0.000
	moderate	\$369.50	30	\$0.000
	severe	\$1,509.09	5	\$0.000
	Dry Season Average Cost	\$231.08	110	\$306.255
Transitional season	mild	\$90.51	41	\$0.000
	moderate	\$369.50	16	\$0.000
	Transitional Season Average Cost	\$168.82	57	\$126.476
Wet season	mild	\$90.51	29	\$0.000
	moderate	\$369.50	8	\$0.000
	severe	\$1,509.09	1	.
	Wet Season Average Cost	\$186.58	38	\$248.475

Referral from a lower level of healthcare facility.

Table 7 shows that when the patient is referred from a lower level of care health facility the average cost of treatment is \$430.48, mostly due to ambulance transport cost. However, if a patient is not referred and the directly comes to the hospital for treatment, the average cost is \$168.45.

Table 7. Average Cost of Treatment per Severity by Referred

Referred	Severity of asthma	Mean	N	Std. Deviation
No	mild	\$90.51	135	\$0.000
	moderate	\$369.50	39	\$0.000
	severe	\$1,509.09	2	\$0.000
	Average Cost	\$168.45	176	\$185.027
Yes	mild	\$90.51	10	\$0.000
	moderate	\$369.50	15	\$0.000
	severe	\$1,509.09	4	\$0.000
	Average Cost	\$430.48	29	\$457.679

Treatment in the emergency department or hospitalization or both.

Table 8 shows that the average cost of treatment in the emergency room is \$150.43, in the observation room it is \$272.93, and when a patient is admitted to the hospital it is \$887.50.

Table 8. Average Cost of Treatment per Severity by Area of consultation

Area of consultation	Severity of asthma	Mean	N	Std. Deviation
Hospital	moderate	\$369.50	6	\$0.000
	severe	\$1,509.09	5	\$0.000
	Average Cost	\$887.50	11	\$595.131
Observation	mild	\$90.51	9	\$0.000
	moderate	\$369.50	17	\$0.000
	Average Cost	\$272.93	26	\$135.356
ER	mild	\$90.51	136	\$0.000
	moderate	\$369.50	31	\$0.000
	severe	\$1,509.09	1	.
	Average Cost	\$150.43	168	\$151.282

Type of treatment received.

We measured treatment intensity by type and number of treatments provided to the patient. Table 9 displays the average cost of treating asthma attack by intensity of treatment. In general terms, the treatment intensity is related to the severity of asthma; therefore with increasing intensity of treatment, we see an increase in the average cost of treating asthma attacks. Therefore, at low intensity (0-1) the cost is \$90.51, at medium intensity (28-31) it is \$369.50, and at high intensity (70-75) the cost is \$1,509.09. All of these estimates correspond to the average cost of asthma treatment according to severity.

Table 9. Average Cost of Treatment by Treatment Intensity

Treatment intensity	Mean	N	Std. Deviation
0	\$90.51	1	.
1	\$90.51	1	.
2	\$103.19	22	\$59.481
3	\$103.19	22	\$59.481
4	\$90.51	15	\$0.000
5	\$140.33	28	\$108.812
9	\$90.51	1	.
12	\$183.51	3	\$161.075
14	\$276.50	3	\$161.075
15	\$369.50	2	\$0.000
17	\$202.11	5	\$152.809
18	\$369.50	2	\$0.000
20	\$369.50	1	.
22	\$90.51	2	\$0.000
23	\$369.50	3	\$0.000
25	\$369.50	1	.
28	\$369.50	1	.
29	\$369.50	1	.
31	\$369.50	1	.
38	\$369.50	1	.
43	\$369.50	1	.
50	\$369.50	1	.
51	\$1,509.09	1	.
53	\$1,509.09	1	.
70	\$1,509.09	2	\$0.000
71	\$1,509.09	1	.
75	\$1,509.09	1	.

Asthma Attack Statistics Among Children Treated at the Tertiary Level of Healthcare in the Republic of Panama.

Figure 5 shows that 54.6% of cases of asthma attack evaluated in this study were male, while 45.4% were female.

Figure 5. Percentage of Asthma Attack Cases by Gender

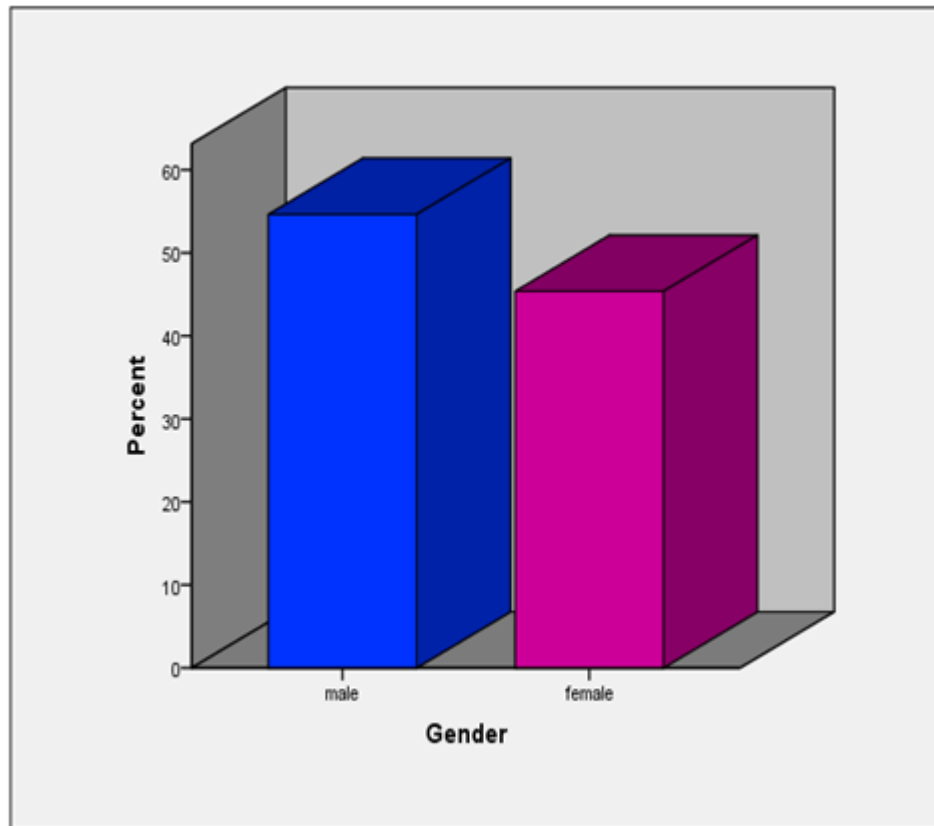
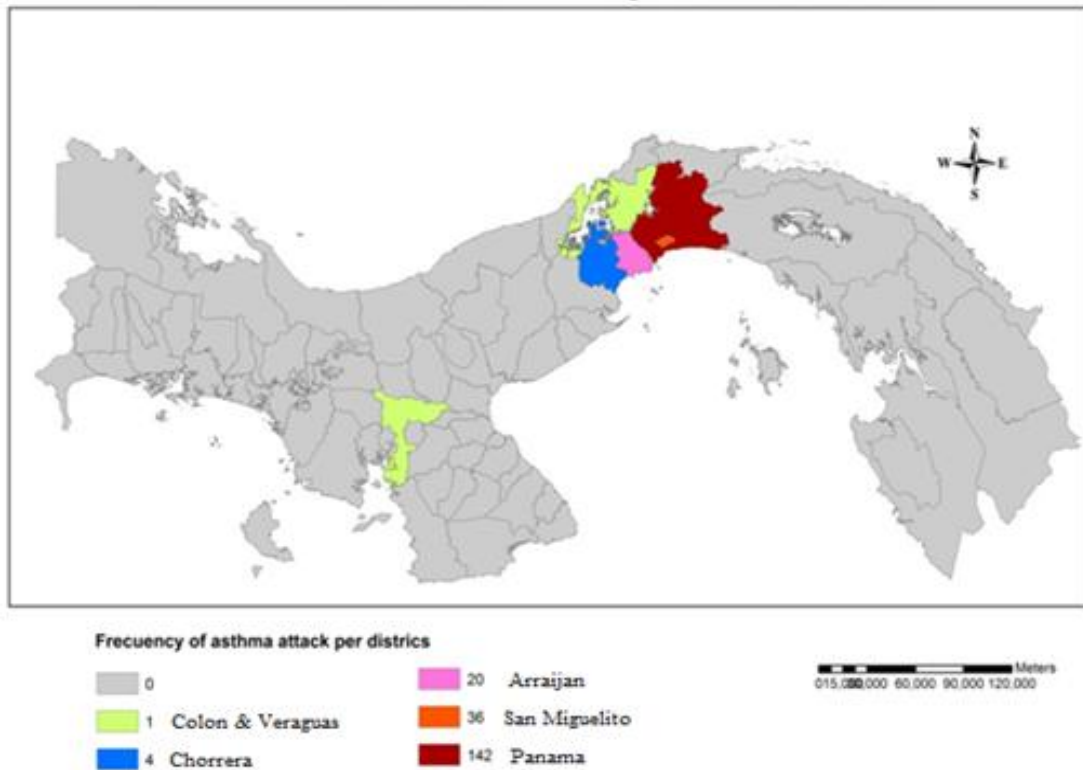


Figure 5. Source: SPSS chart of the descriptive analysis of the study: Costs of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama

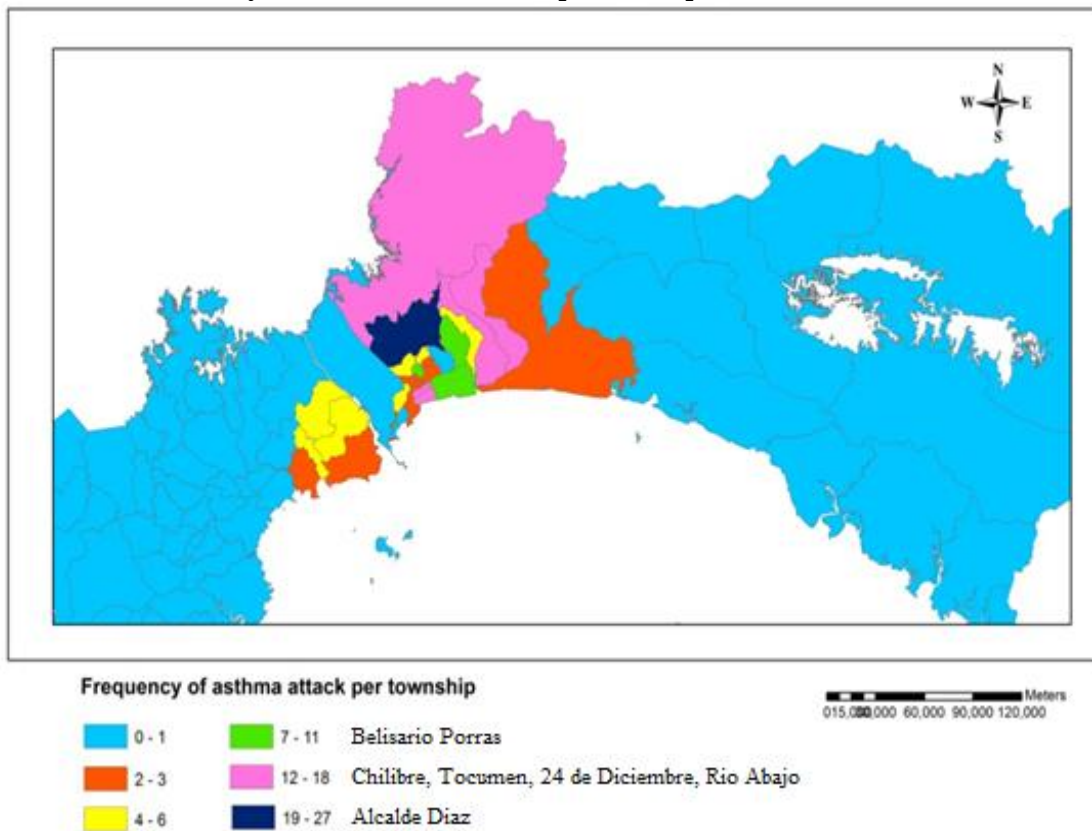
With reference to the area of residence of the studied cases, estimates displayed in Figure 6 show that most of the cases occurred in the Province of Panama, specifically in the District of Panama with a total of 142 cases (69.3%), followed by San Miguelito District with 36 cases (17.6%). In this case, it is important to mention that the HEPOTH is located in the District of Panama whose population represents 53% of the total population of the Province of Panama, followed in descending order by the San Miguelito District with 17.7% of the total population of the province (National Institute of Statistic and Census, 2011).

Figure 6. Frequency of Asthma Attacks per District in the Study Sample During January to June 2012 at the *Hospital de Especialidades Pediatricas*



Out of the 142 cases in the District of Panama, 26 cases were from the township Alcalde Diaz, 18 from Tocumen, 13 from 24 de Diciembre, 14 from Rio Abajo and 14 from Chilibre. Of the 36 cases in the District of San Miguelito, 11 were from the township Belisario Porras (Figure 7). It is noteworthy that these townships have settlements with the highest poverty rates in each of their respective districts (National Institute of Statistic and Census, 2011).

Figure 7. Frequency of Asthma Attacks per Township in the Study Sample During January to June 2012 at the *Hospital de Especialidades Pediatricas*



In Figure 8 we can see that children with the highest incidence of asthma attacks are between the ages of 0 and 4 years with 70.2%, followed by children whose ages range from 5 to 9 years with 21%, and finally children between ages 10 and 14 years with 18%.

Figure 8. Percentage of Asthma Attacks by Age Range

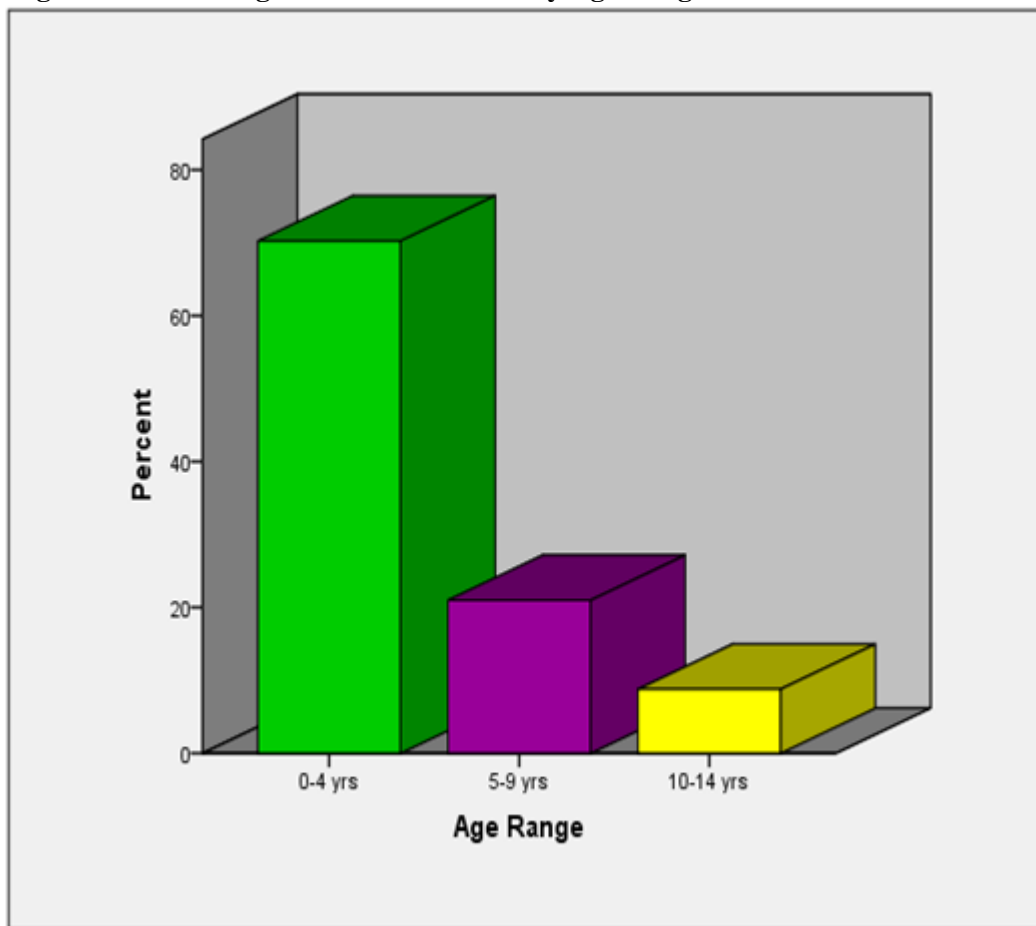


Figure 8. Source: SPSS chart of the descriptive analysis of the study: Costs of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama

We can observe in Figure 9 that most cases of asthma attack, 53.7%, occurred in the dry season, followed by 27.8% during the transitional season and 18.5% of cases during the wet season.

Figure 9. Percentage of Asthma Attacks Cases by Season

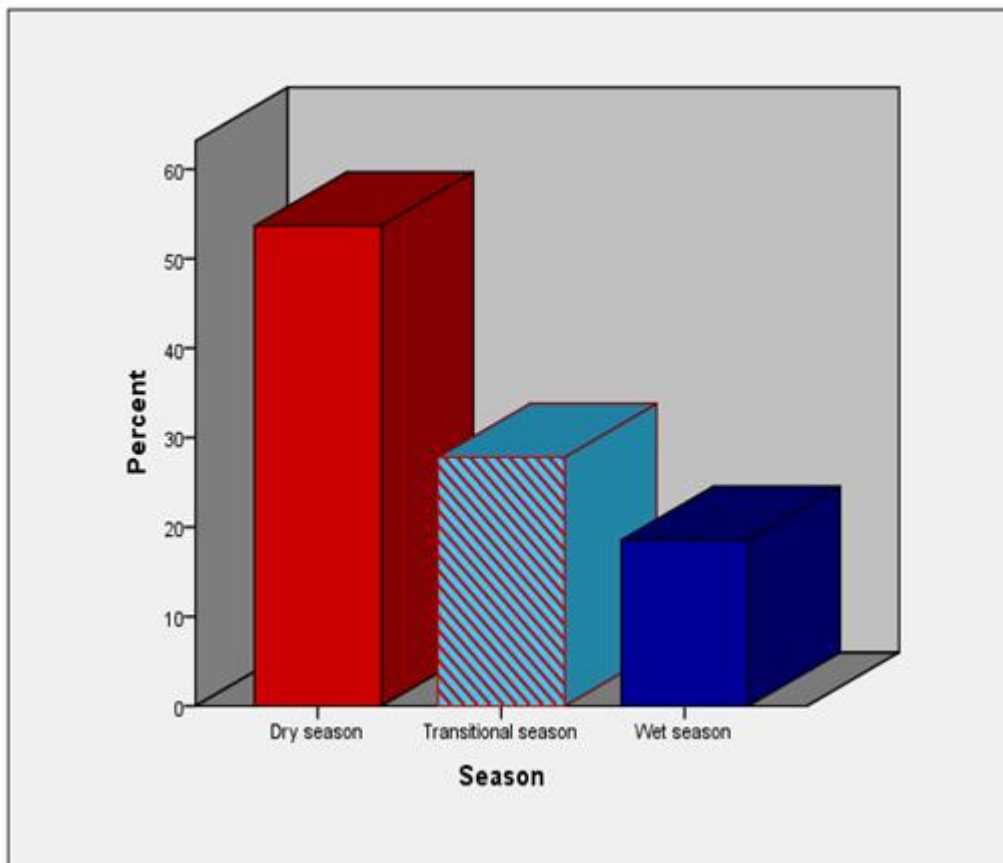


Figure 9. Source: SPSS chart of the descriptive analysis of the study: Costs of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama

Figure 10 reflects the fact that 70.2% of the studied cases of asthma attack did not have comorbidities associated with them. However, of the cases with comorbidities, 9.3% had acute rhinopharyngitis and 4.9% had bronchopneumonia, followed by the common cold and community-acquired pneumonia.

Figure 10. Comorbidities

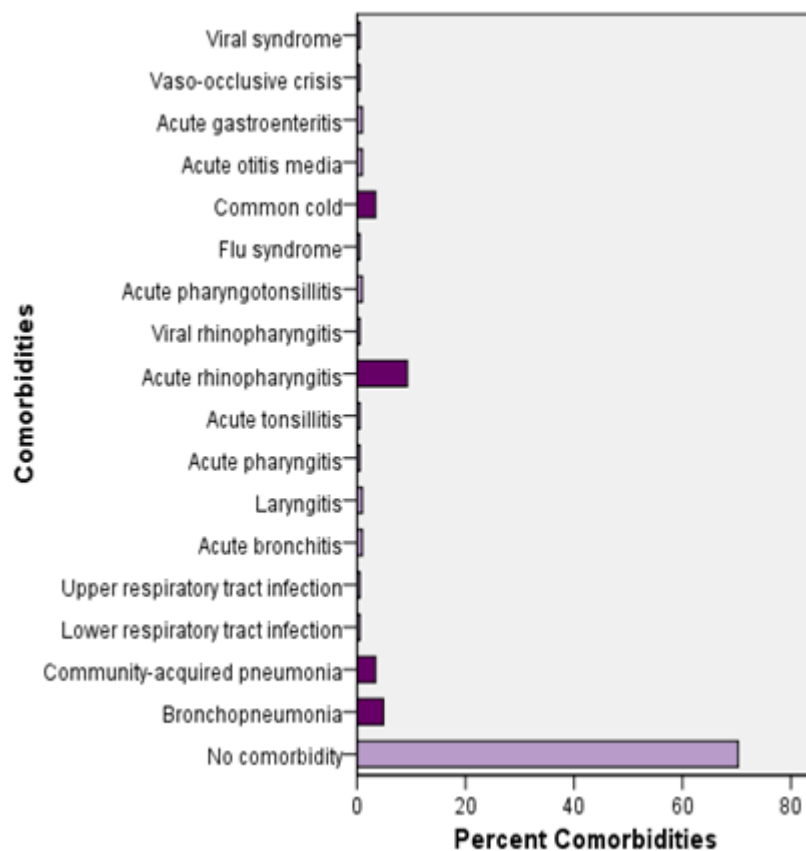


Figure 10. Source: SPSS chart of the descriptive analysis of the study: Costs of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama

CHAPTER FIVE: DISCUSSION

All the answers to our research questions were based on a single variable: the severity of the asthma attack. As we saw in the previous chapter, most asthma attacks treated at the *Hospital de Especialidades Pediátricas* were mild cases. This high proportion of mild cases directly affects the average cost of treating asthma attacks, resulting in a relatively low value. Another important finding is the fact that such a high percentage of mild cases that correspond to the primary and secondary level of care were treated in a tertiary level hospital.

Furthermore, we found that there is indeed a change in the average cost of asthma treatment according to sociodemographic variables, season, referral from a lower level of healthcare facility, severity of asthma, place where the care was received, and the type of treatment received. So, again we found that the number of cases associated with the severity of the attack were associated with the variation in the cost. It is noteworthy that in the case of a severe asthma attack we did not calculate the cost of any case that received attention in the Intensive Care Unit (ICU). This is important because the higher ICU costs constitute outliers that would have affected mean estimates.

With reference to the prevalence of asthma in Panama compared to international statistics, the results are consistent with these statistics indicating that most asthma attacks were in males, children under five years old and residents in low socioeconomic income areas. With regard to the time of year that had the highest percentage of asthma attacks and comorbidities, we expected to have the highest number of cases to occur in the wet

season and to be mostly associated with viral infections. Regarding comorbidities, although most cases were not associated with any comorbidity, those cases that were associated, were associated with viral and bacterial infections mentioned in the literature, such as acute rhinopharyngitis, the common cold, and pneumonia.

Limitations

This study is not without limitations. The numbering of inpatient medical records was done with paper copies of the admission/discharge record; therefore, sometimes after the record was chosen for the study, it was not possible to locate the complete file in the Archive Section, either because that day the patient had an appointment and the medical record was in use or just because it was impossible to locate. In this case, the records were replaced by the record immediately following in the numbering system developed for sampling.

Another limitation was the information registered in the records was incomplete sometimes, particularly in the ER records, where in several occasions the information was just the diagnosis. In other cases the medications were listed but the number of doses administered was not registered, nor the discharge treatment. To address this situation, in the case of records for which it definitely was impossible to obtain useful information for the study, they were not used.

The third important limitation was the cost information received. Unfortunately, right now with the Cost-20 system, it is not possible to obtain the exact cost of the treatments received by patients. Except for the cost of medical consultations and the bed-day costs, all other costs received were approximated costs. On this point we were

informed that work is currently underway on implementing a new cost system called "*Safiro*" that will have the capacity to provide the exact cost of care for each patient.

Recommendations

After analyzing the data, and evaluating the findings and limitations, I want to make the following recommendations for continuation of this research and for implementation of cost tracking:

1. Complete data collection of all of the files through December 2012. That way we cover all the months of the wet season and we can confirm the findings obtained.
2. Using the areas with the highest incidence of cases, make an assessment of the existing health facilities of the Social Security Fund in those areas that could provide care in the event of an asthma attack, make an assessment of the costs of treatment of asthma attacks in those facilities (if there is any), and compare those costs with the costs obtained in the present study.
3. Conduct a qualitative study, using a survey to investigate the reasons why parents use the Emergency Department of a tertiary healthcare hospital for the treatment of asthma attacks, inquiring about family and personal medical history of asthma patients, as well as the socioeconomic background of these patients.
4. Recommend to the authorities of the Social Security Fund the prompt implementation of the *Safiro* System, which would enable us to know with more accuracy the costs of treating asthma attacks at all levels of healthcare.

The information obtained in this study can be useful as a basis for health planning within the Social Security Fund with respect to asthma attacks. Similarly, upon completion of

these recommendations, those results will be very useful for decision-making in health policy within the institution.

REFERENCES

- Babbie, E. (2008). *The Basics of Social Research. T. L. Sampling*. Belmont, CA: Thompson Wadsworth.
- CDC. (2011, May). *Vital Sign*. Retrieved from <http://www.cdc.com>
- CDC. (2012, May). *Trend in Asthma Prevalence, Health Care and Mortality in the United States 2001-2010*. Retrieved from <http://www.cdc.com>
- Global Initiative for Asthma [GINA]. (2012). *Global Strategy for Asthma Management and Prevention*. Retrieved from <http://www.ginasthma.org>
- International Federation of Medical Student's Association [IFMSA]. (2012). *Panama, our health care system*. Retrieved from Panamanian Medical Student Alliance to National and International Cooperation: www.IFMSA-panamaourhealthcaresystem.mht
- Medcenter. (2013). Retrieved from http://www.medcenter.com/Medscape/content.aspx?LangType=2058&id=1469&menu_id=641
- Ministry of Health. (1969, Jan 15). Cabinet Decree No.1. Panama: Government of Panama.
- Ministry of Tourism of Panama. (2012). *Important information about Panama*. Retrieved from Demography of Panama: www.visitpanama.com
- Moreno Bolton, R., & Alvarez Vera, A. (1995). *Boletin Escuela de Medicina P. Universidad Catolica de Chile*. Retrieved from Manejo de la Crisis Asmática: http://escuela.med.puc.cl/paginas/publicaciones/boletin/html/asma/4_8.html
- National Institute of Health. (September 17, 2012). *National Heart, Lung and Blood Institute*. Retrieved from <http://www.nhlbi.nih.gov/health-spanish/health-topics/temas/asthma/diagnosis.html>
- National Institute of Statistic and Census. (2011). *Panama en cifras: años 2006-2010*. Panama: General Comptroller of the Republic of Panama.
- Smithsonian Tropical Research Institute. (2013, Feb 25). *About Panama*. Obtained from <http://www.stri.si.edu>

- Social Security Fund. (2005, Dec. 27). Law No.51. *Organic Law*. Panama: Government of Panama.
- Social Security Fund. (2005, Dec. 27). Law No.51, Organic Law. *Title I, Chapter VII*. Panama: Government of Panama.
- Social Security Fund. (2005, Dec. 27). Law No.51, Organic Law. *Title II, Chapters I and II*. Panama: Government of Panama.
- Social Security Fund. (2012). *Report of Patient Care from the Emergency Department, Yearly 2011*. Panama: Medical Records and Health Statistics Department.
- U.S. Library of Congress. (2012). *Panama-GEOGRAPHY*. Retrieved from <http://www.panamageography.mht>
- World Allergy Organization [WAO]. (2011). *White Book on Allergy*. Retrieved from <http://www.worldallergy.com>
- World Health Organization [WHO]. (2007). *Global Surveillance, Prevention and Control of Chronic Respiratory Diseases*. Retrieved from <http://www.who.com>
- World Health Organization [WHO]. (2012). *Chronic Respiratory Diseases*. Retrieved from Asthma Definitions: <http://www.who.com>
- World Travel Guide (2012), Panama Map, Columbus Travel Media, LTD

APPENDIX A: ADDITIONAL TABLES

Table A1. Random Number Table

Random Number Generator

Use the Random Number Generator to create a list of random numbers, based on your specifications. The numbers you generate appear in the [Random Number Table](#).

For help in using the Random Number Generator, read the [Frequently-Asked Questions](#) or review the [Sample Problems](#).

- ▲ Enter a value in each of the first three text boxes.
- ▲ Indicate whether duplicate entries are allowed in the table.
- ▲ Click the Calculate button to create a table of random numbers.

Calculate

Note: The seed value is optional. Leave it blank to generate a new set of numbers. Use it to repeat a previously-generated set of numbers.

How many random numbers?

Minimum value

Maximum value

Allow duplicate entries

Seed (optional)

Random Number Table

[Random Number Generator](#) | [Frequently-Asked Questions](#) | [Sample Problems](#)

205 Random Numbers

```

01496 00919 01556 01702 01811 01482 00414 01561 00722 00093 01979 01526 00282 01957 01592
00085 00494 01869 01855 01350 00809 01886 00713 01210 01776 01043 01732 01174 01337 00304
01891 01789 01548 00217 00098 00999 01864 00779 01012 00859 01320 01446 02031 00823 00881
01254 01644 01438 00546 01166 01908 00647 01408 01183 00766 02017 00318 00340 00274 00472
01935 01658 01943 01087 01600 01570 00151 00296 00406 00076 01065 01666 01372 00744 00027
00120 00933 00005 00186 00735 01144 01973 00450 02001 01460 00480 01364 01315 00370 01693
00326 01825 01987 00955 01995 00384 00142 00867 00749 01649 00458 01430 01117 00963 01424
00041 00625 01474 00985 01358 00238 00033 01196 01271 00502 01298 01512 01833 01416 00612
00969 00990 00925 01122 02039 00252 00538 01737 00195 00164 00801 00947 01056 00727 01715
00260 02023 01394 00678 00771 01583 00656 00837 01386 01249 00568 01100 00049 00054 01131
01468 01965 01021 01798 00977 01929 00582 01605 00590 01034 00793 01518 00853 01754 01109
01534 01767 01614 00019 00691 01276 01578 01636 02009 00889 00683 01847 01921 01153 01402
00107 00428 00011 01262 01073 01095 01029 01227 00634 00903 01188 01842 00845 00815 01452
01051 01161 00831 01820 00911 00071 02045 01328 00875 01688
    
```

pecs: This table of 205 random numbers was produced according to the following specifications: Numbers were randomly selected from within the range of 1 to 2056.

Table A2. Oxygen and Hospitalization Costs

Cost of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama			
OXYGEN COST - AVERAGE PER SERVICE			
EMERGENCY ROOM			
MONTH	No. PATIENTS	TOTAL COST	MEAN AVERAGE COST
January	443	1708.14	3.86
February	494	1797.81	3.64
March	638	2166.29	3.40
April	572	2161.68	3.78
May	103	2212.34	21.48
June	703	2392.67	3.40
MONTHLY AVG			6.59
HOSPITALIZATION ROOM			
MONTH	No. PATIENTS	TOTAL COST	MEAN AVERAGE COST
January	66	124.67	1.89
February	74	151.00	2.04
March	160	224.97	1.41
April	133	229.85	1.73
May	12	309.28	25.77
June	200	281.35	1.41
MONTHLY AVG			5.71
NEUMOLOGY ROOM			
MONTH	No. PATIENTS	TOTAL COST	MEAN AVERAGE COST
January	116	420.48	3.62
February	139	467.75	3.37
March	190	863.47	4.54
April	123	506.86	4.12
May	26	369.75	14.22
June	146	341.55	2.34
MONTHLY AVG			5.37

Table A3. Other Costs

Cost of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama			
	Bed Day Cost	Observation room	126.13
		Hospitalization room	144.75
		Neumology room	137.82
	Physician Cost	ER pediatrician	24.43
		General pediatrician	30.73
		Neumologist	15.58
	Dx Cost	Blood Test	12.09
		Chest X Ray	10.07
		Blood culture	50.00
	Tx Cost	Oral Medication	5.68
		IV medications	3.22
		IV solutions (Sol)	3.22
		Inhaloterapies	3.22
		Inhalers	5.68

Table A4. Codebook

Cost of Treatment of Asthma Attacks in a Tertiary Level Healthcare Hospital in Panama				
Season	Dry (Before April 15)	1		
	Transition (April 15 - May 15)	2		
	Wet (After May 15)	3		
Gender	Male	1		
	Female	2		
Age Range	0-4 yrs	1		
	5-9 yrs	2		
	10-14 yrs	3		
Districts	Panama	1		
	San Miguelito	2		
	Arraijan	3		
	Chorrera	4		
	Other	5		
Township	Alcalde Diaz	101	Rufina Alfaro	201
	Ancon	102	Arnulfo Arias	202
	Bella Vista	103	Amelia Denis De Icaza	203
	Bethania	104	Victoriano Lorenzo	204
	Calidonia	105	Jose Domingo Espinar	205
	Curundu	106	Belisario Frias	206
	Chilibre	107	Mateo Iturralde	207
	Chorrillo	108	Belisario Porras	208
	Juan Diaz	109	Omar Torrijos	209
	Mañanitas	110	Ernesto Cordoba	210
	Parque Lefevre	111		
	Pedregal	112	Arraijan Cabecera	301
	Pueblo Nuevo	113	Burunga	302
	Rio Abajo	114	Cerro Silvestre	303
	San Felipe	115	Jose D. Arosemena	304
	San Francisco	116	Nuevo Emperador	305
	Santa Ana	117	Santa Clara	306
	Tocumen	118	Veracruz	307
	24 de diciembre	119	Vista Alegre	308
	Chepo	120		
	Pacora	121	Barrio Colon	401
			Herrera	402
			Puerto Caimito	403
			Los Diaz	404
			Other	501
	Area of Consultation	ER	1	
Observation		2		
Hospital		3		
Referred	No	0		
	Yes	1		
Severity	Mild	1		
	Moderate	2		
	Severe	3		
Physician	ER pediatrician (ERP)	1		
	General pediatrician + ERP	2		
	Neumologist + ERP	3		
Other Diagnoses	No comorbidity	0	Acute rhinopharyngitis	9
	Bronchopneumonia	1	Viral rhinopharyngitis	10
	Community-acquired pneumonia	2	Acute pharyngotonsillitis	11
	Lower respiratory tract infection	3	Flu syndrome	12
	Upper respiratory tract infection	4	Common cold	13
	Acute bronchitis	5	Acute otitis media	14
	Laryngitis	6	Acute gastroenteritis	15
	Acute pharyngitis	7	Vaso-occlusive crisis	16
Acute tonsillitis	8	Viral syndrome	17	

APPENDIX B: ADDITIONAL FIGURES

Figure B1. USF IRB Approval



DIVISION OF RESEARCH INTEGRITY AND COMPLIANCE
Institutional Review Boards, FWA No. 0000166
12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-47
(813) 974-5638 • FAX (813) 974-56

November 27, 2012

Nydia Flores Chiari, MD
Health Policy and Management
13201 Bruce B. Downs Blvd
Tampa, FL 33612

RE: **Expedited Approval for Initial Review**
IRB#: Pro00010216
Title: Cost of Treatment of Asthma Attack in a Tertiary Level Healthcare Hospital in Panama

Dear Dr. Flores Chiari:

On 11/27/2012 the Institutional Review Board (IRB) reviewed and **APPROVED** the above referenced protocol. Please note that your approval for this study will expire on 11/27/2013.

Approved Items:

Protocol Document(s):

[Costs of Treatment of Asthma Attack in a Tertiary Level Healthcare Hospital in Panama](#)

It was the determination of the IRB that your study qualified for expedited review which includes activities that (1) present no more than minimal risk to human subjects, and (2) involve only procedures listed in one or more of the categories outlined below. The IRB may review research through the expedited review procedure authorized by 45CFR46.110 and 21 CFR 56.110. The research proposed in this study is categorized under the following expedited review category:

(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

Your study qualifies for a waiver of the informed consent process as outlined in the federal regulations at 45CFR46.116 (d) which states that an IRB may approve a consent procedure which does not include, or which alters, some or all of the elements of informed consent, or waive the requirements to obtain informed consent provided the IRB finds and documents that (1) the research involves no more than minimal risk to the subjects; (2) the waiver or alteration will not adversely affect the rights and welfare of the subjects; (3) the research could not practicably be carried out without the waiver or alteration; and (4) whenever appropriate, the subjects will be provided with additional pertinent information after participation.

As the principal investigator of this study, it is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB. Any changes to the approved research must be submitted to the IRB for review and approval by an amendment.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

A handwritten signature in blue ink that reads "Vjorgensen MD". The signature is written in a cursive style.

E. Verena Jorgensen, MD, Chairperson
USF Institutional Review Board

Figure B2. HEPOTH IRB Approval (English version)

The letterheads read:
Social Security Fund
Logo

Panama, November 1, 2012
HEPOTH-CBI-45-12

Doctor
Nydia Flores Chiari
Principal Investigator

Respected Doctor:

Hereby, you are informed that that within minute # 139 of October 23, 2012, the Committee of Bioethics in Research members of the Hospital de Especialidades Pediatricas "Omar Torrijos Herrera", after having reviewed and evaluated your research protocol entitled: "Cost of Treatment of Asthma Attack in a Tertiary Level Healthcare Hospital in Panama", we decided to approve it.

The members of the Committee who participated in the minutes were the following:

1. Dr. Mirna Caicedo Secretary in charge
2. Mrs. Marysol de Jaén Member
3. Lcda. Carolina Alfú Member
4. Mrs. Marysol de Jaén Member
5. Dr. Eréndira Carreño..... Member
6. Dr. Irina Caballero..... Member
7. Dr. Alex A. Tapia E.....President

Attentively,

Illegible signature

Dr. Alex Tapia E.
President
C.B.I.H.E.P.O.T.H.

Cc. CBIHEPOTH records

I, Vielka Chiari Rivera, Authorized Public Translator of the Republic of Panama, hereby certify that the above document, presented unto me this November 2nd, 2012 into the Spanish language, is a faithful interpretation of the English language of the original document.

