Brazilian

CYSTIC
FIBROSIS
Patient Registry

2010 Annual Report

gbefc

GRUPO
BRASILEIRO DE
ESTUDOS DE
FIBROSE CÍSTICA
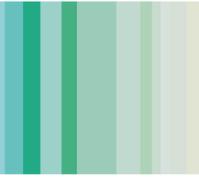
The **Brazilian Cystic Fibrosis Patient Registry (REBRAFC)** contains data collected several centers of cystic fibrosis (CF) care in Brazil. In order to improve the treatment of CF in Brazil, detailed information regarding patients' characteristics and current treatment in different Centers and country regions is essential.

The Brazilian Cystic Fibrosis Patient Registry was implemented and is fully maintained by the Brazilian Cystic Fibrosis Study Group (GBEFC), with the following objectives:

- Measure, research, and compare aspects of cystic fibrosis and its treatment in several Brazilian states, encouraging new therapeutic strategies;
- Provide data for epidemiologic research;
- Facilitate the longitudinal follow-up of the patient;
- Facilitate referral and counter referral of patients;
- Identify special groups for multicenter studies;
- Identify the characteristics of assistance in each Brazilian state / Center for planning assistance actions.
- Encourage Reference Centers to achieve excellence in the care for patients with CF.

This is the second annual report published since the beginning of REBRAFC team activities, and there was a significant increase in the participation of Brazilian centers attending CF patients, with a consequent increase in the number of registered patients (43.6%) and included follow-up data related the year 2010 (45%), as shown in Figure below:
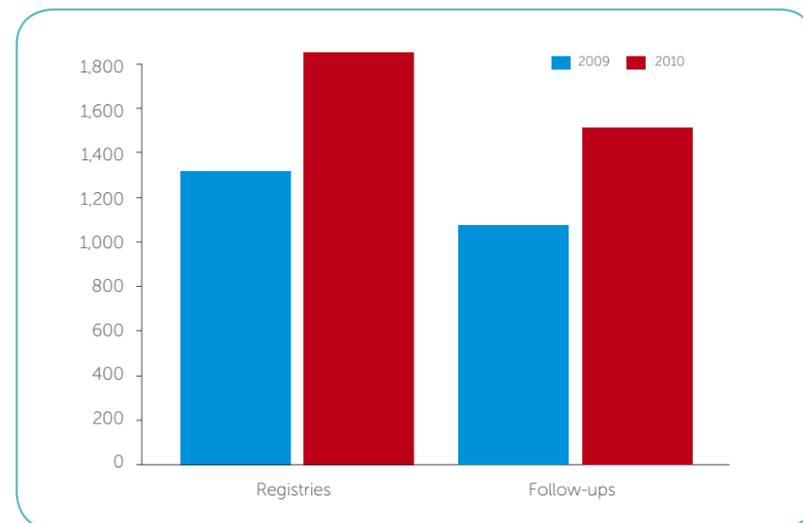
The staff of the Laboratório de Sistemas Integráveis (LSI) from Escola Politécnica de Engenharia of University of São Paulo is responsible for the development and maintenance of the Web platform where the REBRAFC runs. All participating centers were asked to obtain approval of the local Ethics Committees and to obtain consent from parents and / or guardians and directly from older patients, to allow insertion of their data in the database. A leaflet explaining the Registry rules and benefits was distributed to patients and parents/caregivers.

The Web platform incorporates several security mechanisms for data input and information storage, so that only the local centers have access to the full identification of their patients, and no information can be made available for research or multicenter studies without the agreement of each participant center.

Despite the significant increase in the participation of several national CF centers, many of them have not yet entered data or did it incompletely, for various reasons, such as difficulties in the approval by the local ethics committees or simply by lack of initiative of the professionals. The Centers who signed the confidentiality agreement to participate in the REBRAFC are listed in page 54 (some of them did not enter data).

About Cystic Fibrosis and the GBEFC:

Cystic fibrosis (CF) is an autosomal recessive disease with multisystemic involvement (respiratory. gastrointestinal. liver and genitourinary). It is a complex disease still little known in our country, despite the existence of some specialized centers with health professionals dedicated to patient care for many years. Treatment is quite complex and involves high cost medications, but access to care and medications is not uniform in the country.

The Brazilian Cystic Fibrosis Study Group (GBEFC) is a nonprofit organization comprised of healthcare professionals working in the area, created on November 5 2003. Among the activities of the GBEFC, we can cite research, staff training and aid in the development of CF treatment centers in the country, organizing scientific meetings (four editions of the Brazilian CF Congress), working with the Ministry of Health to define a national protocol of CF care and implementation of Newborn Screening in all Brazilian states.

The GBEFC maintains an Internet site (www.gbefc.org.br) that provides information on cystic fibrosis, scientific publications and resources, and also displays the Patient Registry Reports for free download.
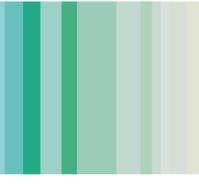
EXECUTIVE COMMITTE OF THE BRAZILIAN CYSTIC FIBROSIS REGISTRY:

Dr. Luiz Vicente Ribeiro Ferreira da Silva Filho

- Executive coordinator of the REBRAFC
- Assistant professor at the Pediatric Pulmonology Unit, Instituto da Criança HCFMUSP
- Researcher at the Research and Learning Institute of Hospital Israelita Albert Einstein and at Instituto de Medicina Tropical of University of São Paulo
- Vice-President of the Brazilian Cystic Fibrosis Study Group (GBEFC)

Dr. Francisco José Caldeira Reis

- Professor of Pediatrics at Federal University of Minas Gerais
- President of the Brazilian Cystic Fibrosis Study Group (GBEFC)
- Pediatric Pulmonologist trained at University of Manitoba – Childen's Hospital of Winnipeg – Manitoba – Canada.
- Advisor of the Hospital Infantil João Paulo II - Rede FHEMIG - Belo Horizonte, Minas Gerais

Dra. Neiva Damaceno

- Assistant Professor of the Pediatric Pulmonology Group of Faculdade de Ciências Médicas da Santa Casa de São Paulo
- Ex-President of the Brazilian Cystic Fibrosis Study Group (GBEFC)

Adilson Yuuji Hira

- Laboratory of Integrated Systems, Escola Politécnica of University of São Paulo

When the data for this report was extracted from the database (August 2012), 1,798 patients were registered (had identification and diagnostic data), and 1,612 (89.7%) of them had some follow-up data available.

In the description of demographic and diagnostic data, all patients were included. Only data from the year 2010 were included in the Follow-up data.

Table 1
Distribution of patients regarding the input of follow-up data.

| Follow-up data	n	%
No data	186	10.3
Only 2009	152	8.5
Only 2010	578	32.1
Only 2011	20	1.1
2009 and 2010	757	42.1
2010 and 2011	21	1.2
2009, 2010 and 2011	84	4.7
Total	1,798	100

n = number of patients.

Table 2
Distribution of patients by Brazilian State of origin (birth place).

Brazilian State of origin	n (%)	Brazilian State of origin	n (%)
São Paulo	650 (36.2%)	Mato Grosso do Sul	6 (0.3%)
Rio Grande do Sul	278 (15.5%)	Amazonas	5 (0.3%)
Bahia	269 (15%)	Pernambuco	5 (0.3%)
Minas Gerais	142 (7.9%)	Piauí	3 (0.2%)
Santa Catarina	121 (6.7%)	Distrito Federal	2 (0.1%)
Rio de Janeiro	66 (3.7%)	Rondônia	2 (0.1%)
Paraná	63 (3.5%)	Acre	1 (0.1%)
Pará	54 (3%)	Espirito Santo	1 (0.1%)
Ceará	53 (2.9%)	Maranhão	1 (0.1%)
Alagoas	25 (1.4%)	Paraíba	1 (0.1%)
Rio Grande do Norte	22 (1.2%)	Roraima	1 (0.1%)
Not informed	14 (0.8%)	Sergipe	1 (0.1%)
Mato Grosso	12 (0.7%)		

Total	1,798 (100%)

n = number of patients.

Figure 1
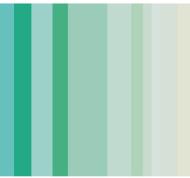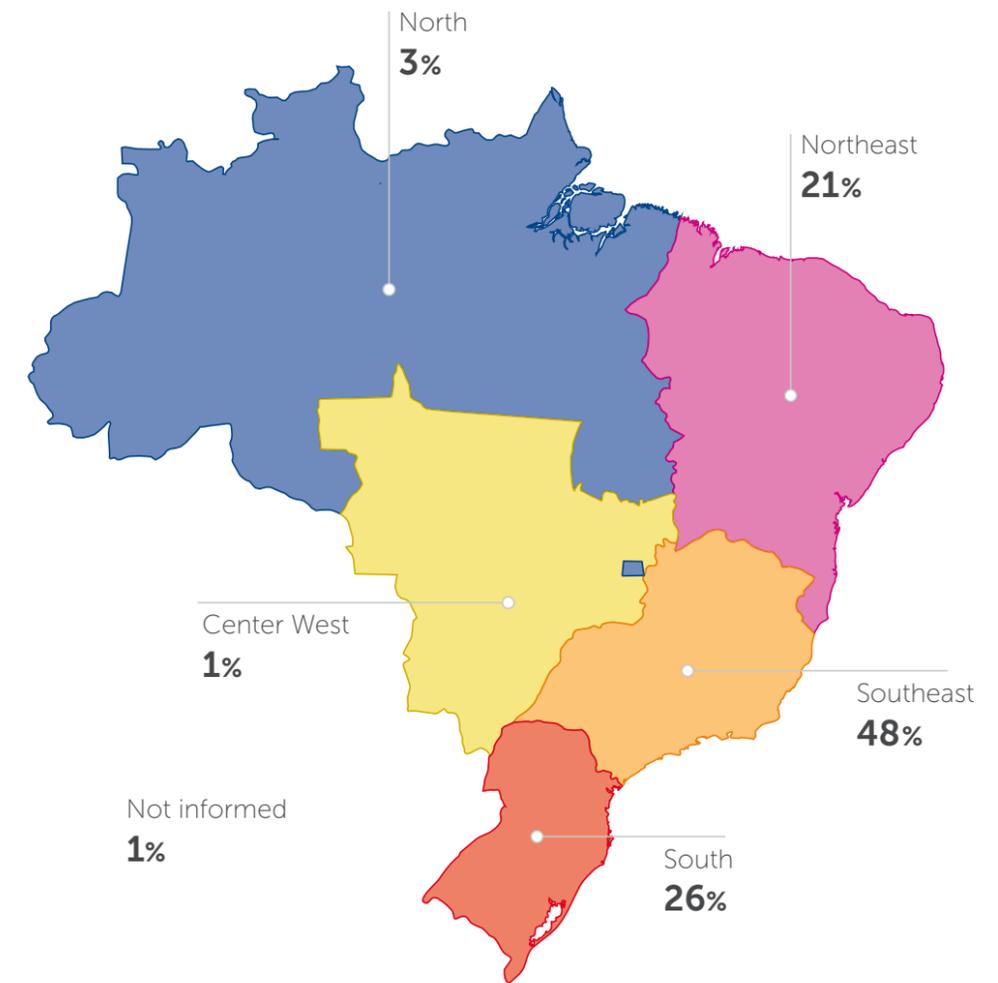**Distribution of patients by Brazilian State of origin (birth place).**

6

7
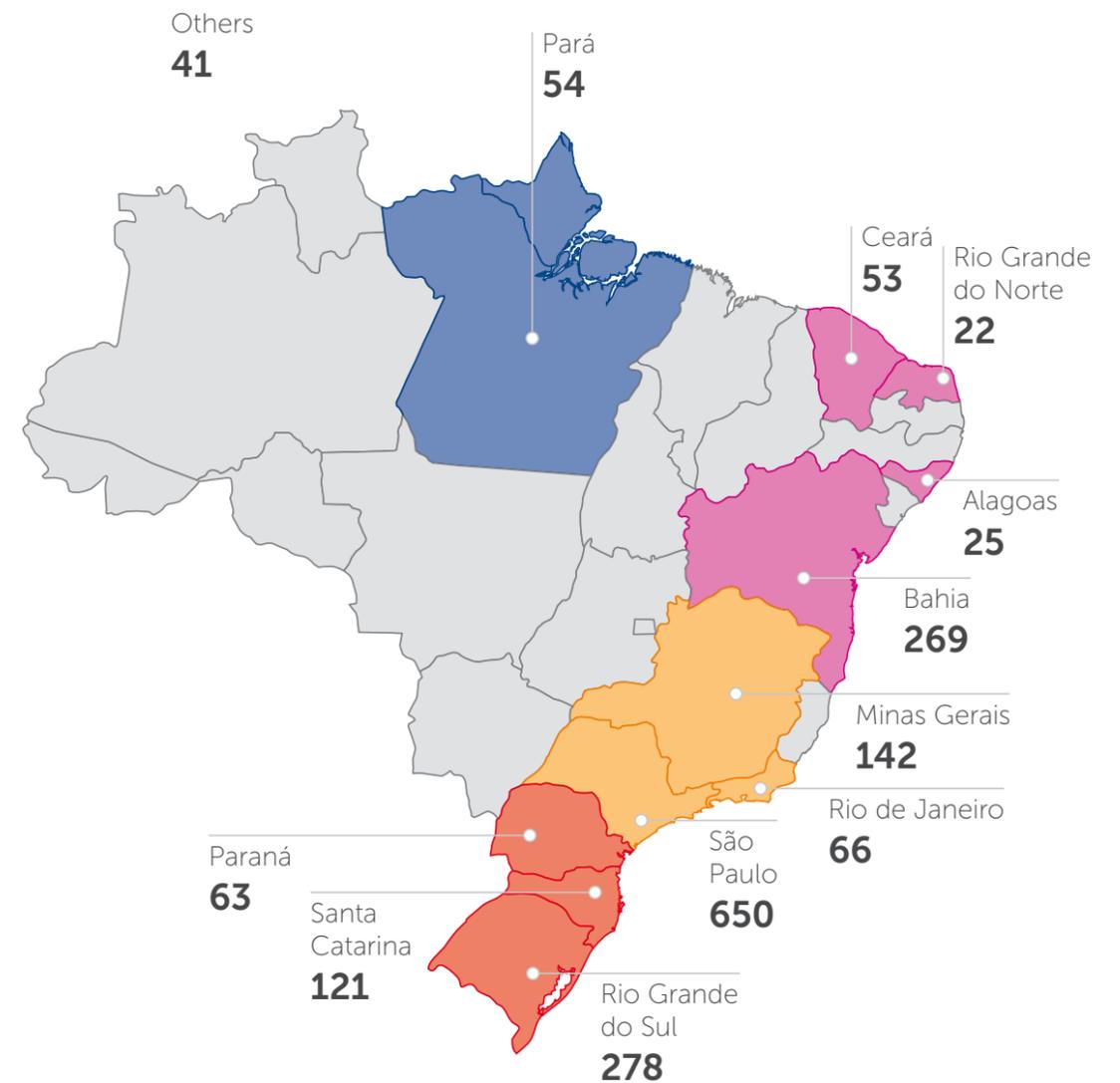
Distribution of patients by Brazilian Region of origin (birth place).

Brazilian Region of origin	n (%)	Brazilian Region of origin	n (%)
Southeast	859 (47.8%)	North	63 (3.5%)
South	462 (25.7%)	Center West	20 (1.1%)
Northeast	380 (21.1%)	Not informed	14 (0.8%)
Total		1,798 (100%)	

n = number of patients.

Figure 2
Distribution of patients by Brazilian Region of origin (birth place).

North
3%

Northeast
21%

Center West
1%

Southeast
48%
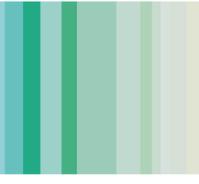
Not informed
1%

South
26%

Table 4

Distribution of patients by Brazilian State where they are treated.

Brazilian State of treatment	n (%)	Brazilian State of treatment	n (%)
São Paulo	693 (38.5%)	Rio de Janeiro	59 (3.3%)
Rio Grande do Sul	305 (17%)	Pará	55 (3.1%)
Bahia	276 (15.4%)	Ceará	53 (2.9%)
Minas Gerais	132 (7.3%)	Alagoas	25 (1.4%)
Santa Catarina	106 (5.9%)	Rio Grande do Norte	23 (1.3%)
Paraná	69 (3.8%)	Pernambuco	2 (0.1%)

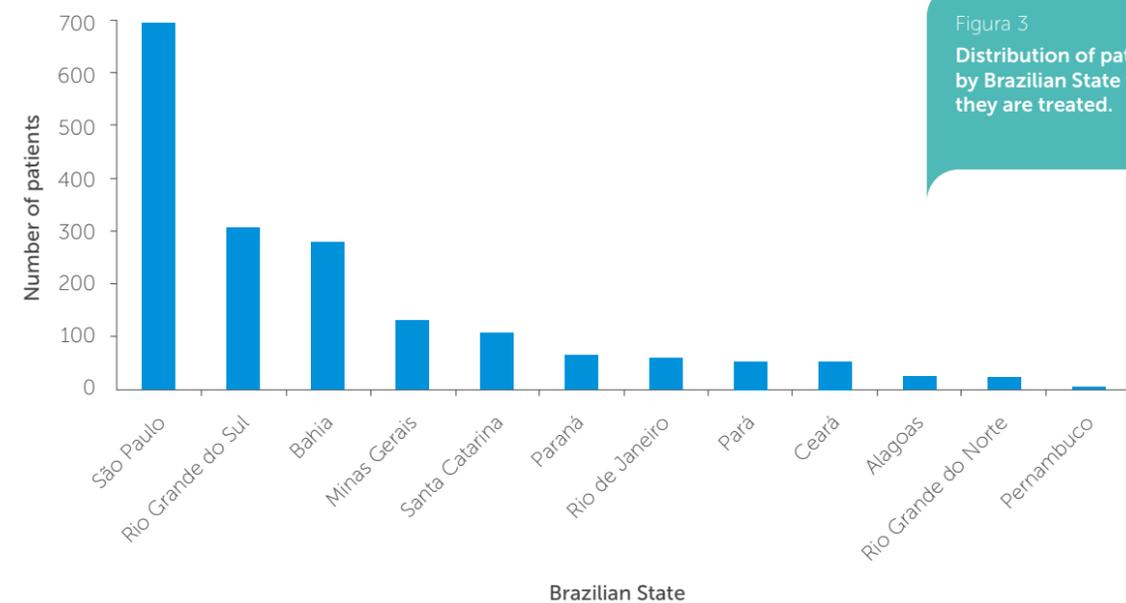|	
Total	1,798 (100%)

n = number of patients.

Figura 3

Distribution of patients by Brazilian State where they are treated.

Table 5

Distribution of patients by Brazilian State where they are treated using only follow-up data from years 2009 and 2010.

Brazilian State of treatment	Follow up year 2009 n (%)	2010 n (%)	Brazilian State of treatment	Follow up year 2009 n (%)	2010 n (%)
São Paulo	392 (39.5%)	612 (42.5%)	Rio de Janeiro	–	39 (2.7%)
Rio Grande do Sul	240 (24.2%)	268 (18.6%)	Pará	55 (5.5%)	–
Bahia	216 (21.8%)	210 (14.6%)	Ceará	1 (0.1%)	3 (0.2%)
Minas Gerais	28 (2.8%)	122 (8.5%)	Alagoas	–	22 (1.5%)
Santa Catarina	5 (0.5%)	88 (6.1%)	Rio Grande do Norte	16 (1.6%)	22 (1.5%)
Paraná	40 (4%)	53 (3.7%)	Pernambuco	–	1 (0.1%)

Total of patients	993 (100%)	1,440 (100%)

n = number of patients.

Number of patients / Brazilian State

São Paulo 392 / 612
Rio Grande do Sul 240 / 268
Bahia 216 / 210
Minas Gerais 28 / 122
Santa Catarina 5 / 88
Paraná 40 / 53
Pará 55 / 0
Rio de Janeiro 0 / 39
Rio Grande do Norte 16 / 22
Alagoas 0 / 22
Ceará 1 / 3
Pernambuco 0 / 1

Follow-up Year
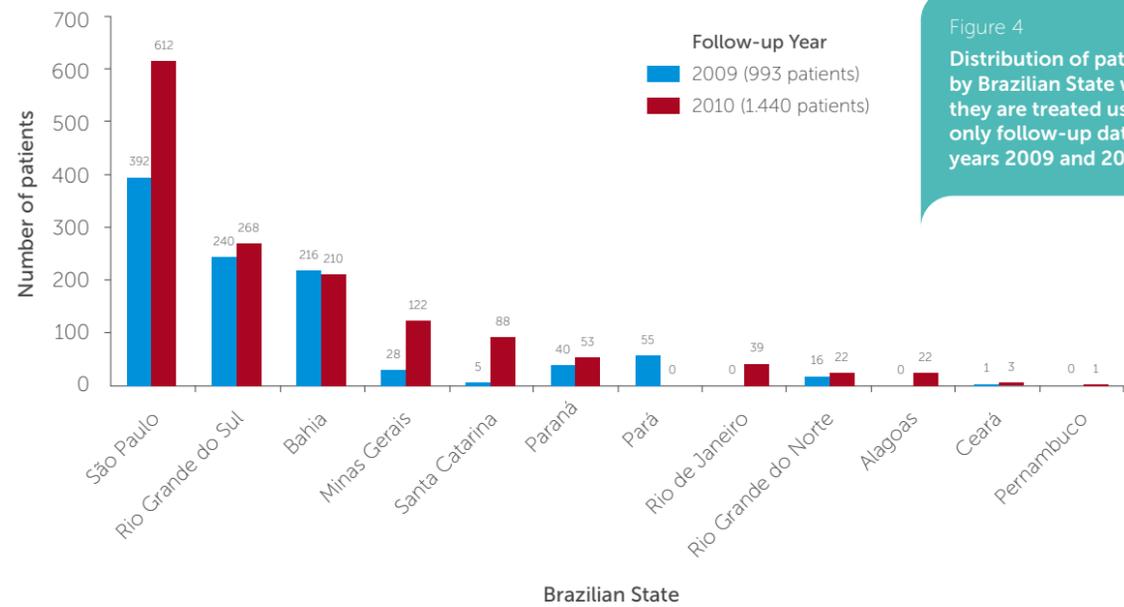2009 (993 patients)
2010 (1.440 patients)

Figure 4
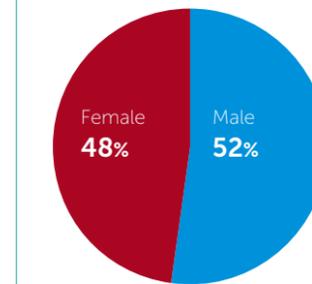**Distribution of patients by Brazilian State where they are treated using only follow-up data from years 2009 and 2010.**

Figure 5
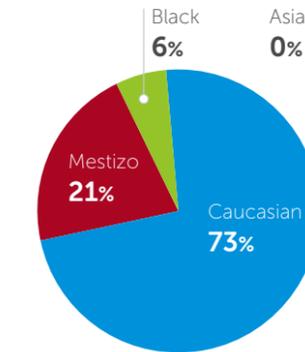**Distribution of patients by gender.**

Female 48%
Male 52%

Black 6%
Asian 0%

Figure 6
Distribution of patients by ethnic group.

Mestizo 21%
Caucasian 73%

Table 6
Gender and ethnic group of Brazilian patients.

Gender	n (%)
Male	943 (52.4%)
Female	855 (47.6%)
Total of patients	1,798 (100%)

Ethnic Group	n (%)
Caucasian	1,304 (72.5%)
Mestizo	383 (21.3%)
Black	106 (5.9%)
Asian	5 (0.3%)
Total of patients	1,798 (100%)

n = number of patients.

Table 7
Description of current age data
(best spirometry or last clinical visit of the year)

Age (years)	
Mean (standard deviation)	12.88 (10.92)
Median (p25-p75)	10.38 (5.91 – 16.29)
Minimum-Maximum	0.09 – 79.62
Total of patients	1,555
No information	243

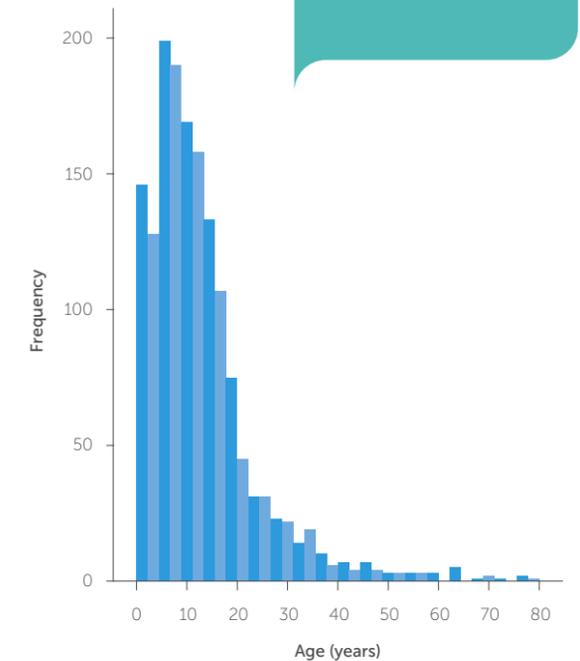*n = number of patients; p25 = 25th percentile; p75 = 75th percentile*

Figur3 7
Distribution of patients according to current age (years).

Table 8
Distribution of patients by age group.

Age Group	
Up to 5 years	323 (20.8%)
> 5 a 10	423 (27.2%)
>10 a 15	348 (22.4%)
>15 a 20	211 (13.6%)
>20 a 25	90 (5.8%)
>25 a 30	52 (3.3%)
>30 a 35	38 (2.4%)
>35 a 40	21 (1.4%)
>40 a 45	13 (0.8%)
>45 a 50	11 (0.7%)
>50 anos	25 (1.6%)
Total of patients	1,555 (100%)
Patients without information	243

Age group (adult-pediatric)	
< 18 years	1,239 (79.7%)
≥ 18 years	316 (20.3%)
Total of patients	1,555 (100%)
Patients without information	243

n = number of patients.

Figure 8
Distribution of patients by age group.

Figure 9
Distribution of patients by age group category (pediatric / adult).

18 years or more
20%

Less than 18 years
80%
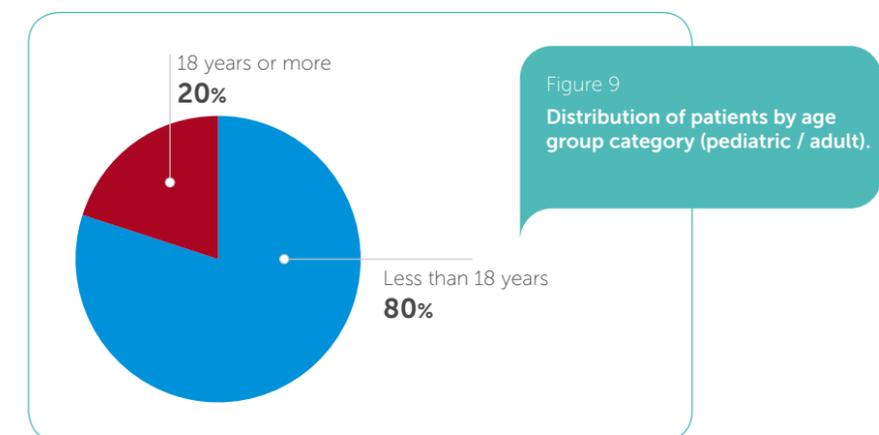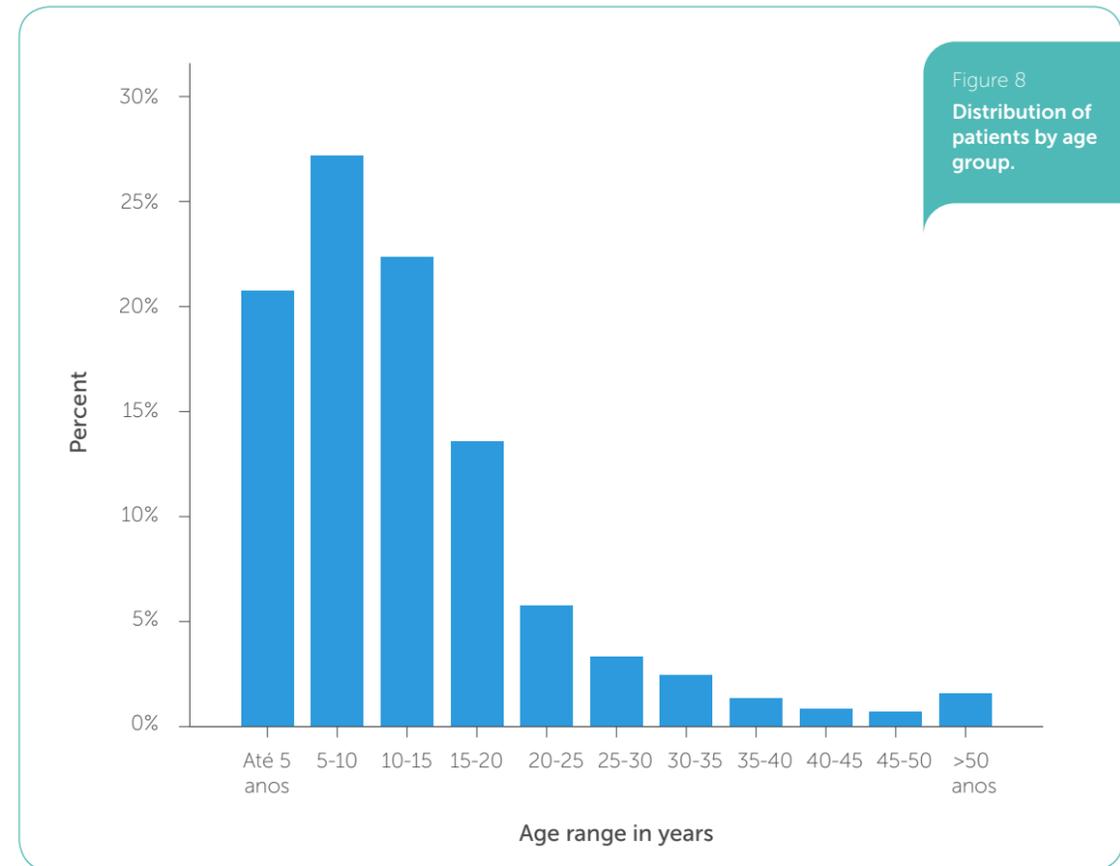
DATA AT DIAGNOSIS

Table 9
Age of patients at diagnosis.

Age (years)	
Mean (standard deviation)	5.91 (10.10)
Median (p25-p75)	1.74 (0.30 – 7.39)
Minimum-Maximum	0 – 75.7
Total of patients	1,769
Patients without information*	29

n=number of patients; p25 = 25th percentile; p75 = 75th percentile
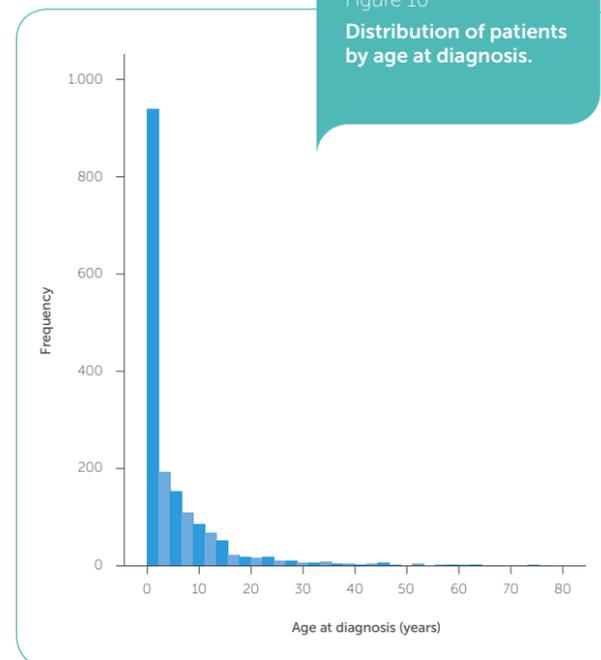* Incorrect birth dates.

Figure 10
Distribution of patients by age at diagnosis.

Table 10
Conditions for diagnosis.

Conditions for diagnosis	n (%)
Respiratory symptoms	1,181 (65.7%)
Steatorrhea or Malabsorption	711 (39.5%)
Deficit of growth / malnutrition	756 (42.0%)
Neonatal screening (IRT)	182 (10.1%)
Clinical or surgical meconium ileus	149 (8.3%)
Familial history	147 (8.2%)
Sinus disease	129 (7.2%)
Metabolic disturbance	104 (5.8%)
Edema / anemia	67 (3.7%)
Unknown condition	39 (2.2%)
Rectal prolapse	16 (0.9%)
Prolonged jaundice	13 (0.7%)

Conditions for diagnosis	n (%)
Infertility	5 (0.3%)
Others*	113 (6,3%)
Positive respiratory culture for *P. aeruginosa*	15
Bronchiectasis	13
Positive respiratory culture for *S. aureus*.	9
Small airways disease	3
Bartter syndrome	2
Pansinusopathy	2
Malabsorption / Hipoalbuminemia	2
Salt crystals on forehead	1
Recurrent pneumonia	1
Recurrent respiratory infections	1
Bronchial hyperrectivity and nasal polyposis	1
Hemoptysis	1
Azoospermia	1
Jejunal atresia	1
Diabetes mellitus	1

Total of patients	1,798 (100%)

n=number of patients. * List of conditions written by the professional (only few were described); more than a condition per case was allowed.

Table 11

Sweat chloride testing results.

	Chloride (mEq/l)	Sweat mass (mg)	Conductivity (mmol/l)
Mean (standard deviation)	87.49 (25.17)	139.73 (74.01)	102.24 (18.86)
Median (p25-p75)	87.23 (68.55-104)	126.50 (100-174.5)	103.50 (94-114)
Minimum-Maximum	5.22-202.50	0.08-470	33-157
Total of patients	1,486	1,133	160

n=number of patients; p25 = 25th percentile; p75 = 75th percentile.
For chloride and sweat mass, means of two measures are displayed.

Table 12

Other tests reported for diagnosis.

	n (%)
Measure of nasal potential difference	89 (4.9%)
Rectal biopsy	68 (3.8%)
Total of patients	1,798 (100%)

n = number of patients.

Table 13

Diagnosis by neonatal screening - Dosage of immunoreactive trypsinogen (IRT).

Dosage of immunoreactive trypsinogen (IRT). (ng/ml)	1st dosage	2nd dosage	Mean of 2 dosages
Mean (standard deviation)	229.43 (130.68)	212.87 (138.10)	228.34 (131.68)
Median (p25-p75)	195.00 (132-294)	174.50 (116-274)	189.00 (134-300)
Minimum-Maximum	24-830	14-902	20.5-830
Total of patients	327	238	330

Cut-off limits for IRT values	1st dosage n (%)	2nd dosage n (%)	Mean of 2 dosages n (%)
< 70 ng/mL	8 (2.4%)	13 (5.5%)	12 (3.6%)
≥ 70 ng/mL	319 (97.6%)	225 (94.5%)	318 (96.4%)
< 110 ng/mL	39 (11.9%)	50 (21.0%)	47 (14.2%)
≥ 110 ng/mL	288 (88.1%)	188 (79.0%)	283 (85.8%)
Total of patients	327	238	330

n=number of patients; p25 = 25th percentile; p75 = 75th percentile.

Table 14

Age in years at the diagnosis: with or without neonatal screening.

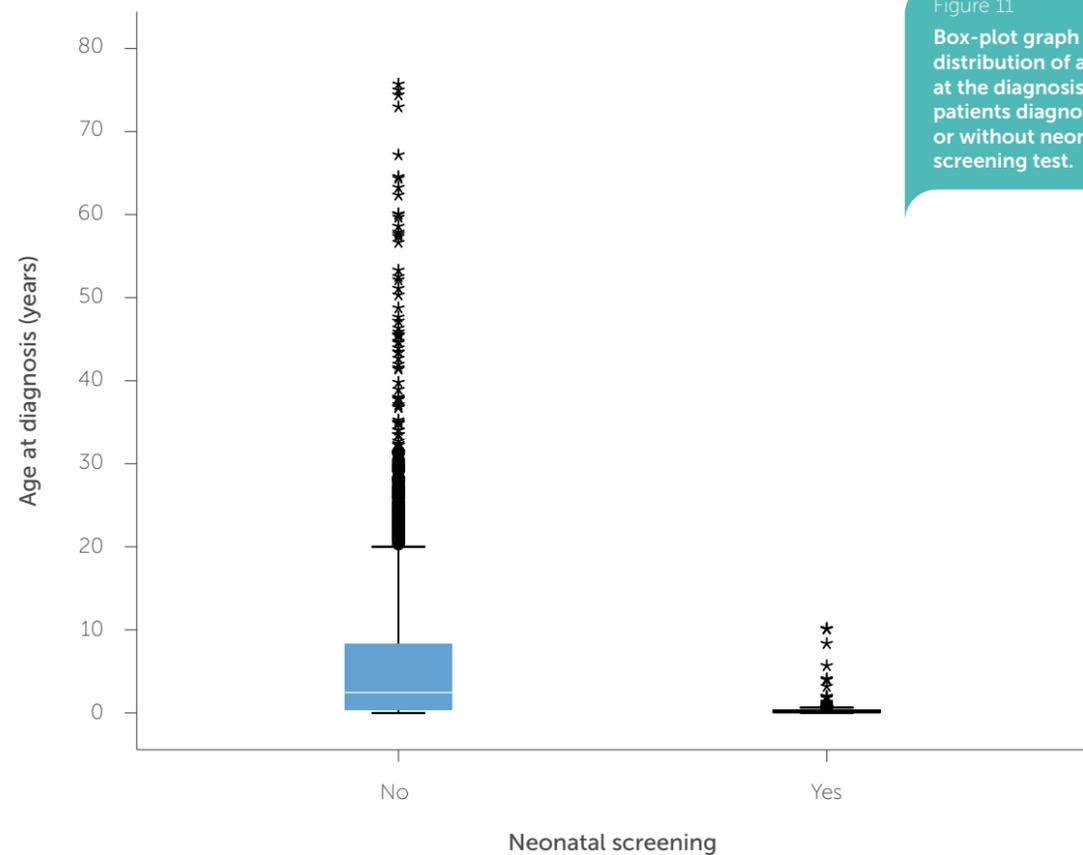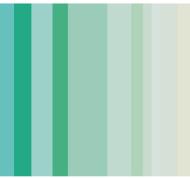|	Neonatal screening		
Age (years)	No	Yes	Total
Mean (standard deviation)	7.23 (10.84)	0.47 (1.25)	5.91 (10.11)
Median (p25-p75)	3.40 (0.61-9.12)	0.15 (0.10-0.32)	1.74 (0.30-7.39)
Minimum-Maximum	0-75.72	0-10.18	0-75.72
Total of patients	1,425	344	1,769
Patients without information	24	5	29

p25 = 25th percentile; p75 = 75th percentile.

Box-plot graph showing distribution of age at the diagnosis in patients diagnosed with or without neonatal screening test.

GENETICS DATA

Genetics data contained in this report should be cautiously interpreted, since the approach for CF genetic testing in Brazil is highly heterogeneous. Some Centers only perform detection of DeltaF508 mutation, while others search panels of 2, 4 or up to 30 or more mutations. There are also Centers reporting genetic polymorphisms in the CFTR gene, that were not included in this report because they may not be used as diagnostic criteria without the presence of other mutations.

Table 15

Status of patients regarding genetic testing for CF.

Genetic testing	n (%)
No	993 (55.2%)
Sim	805 (44.8%)
Total of patients	1,798 (100%)

Quantity of mutations identified per patient	n (%)
None	167 (20.7%)
One	283 (35.2%)
Two or more	355 (44.1%)
Total of patients with genetic testing reported	805 (100%)

Genotype - description	n (%)
DF508/DF508	216 (26.8%)
DF508/Others	355 (44.1%)
DF508/Non-identified	67 (8.3%)
Non-identified	167 (20.7%)
Total of patients with genetic testing reported	805 (100%)

n= number of patients; non-identified= blank field

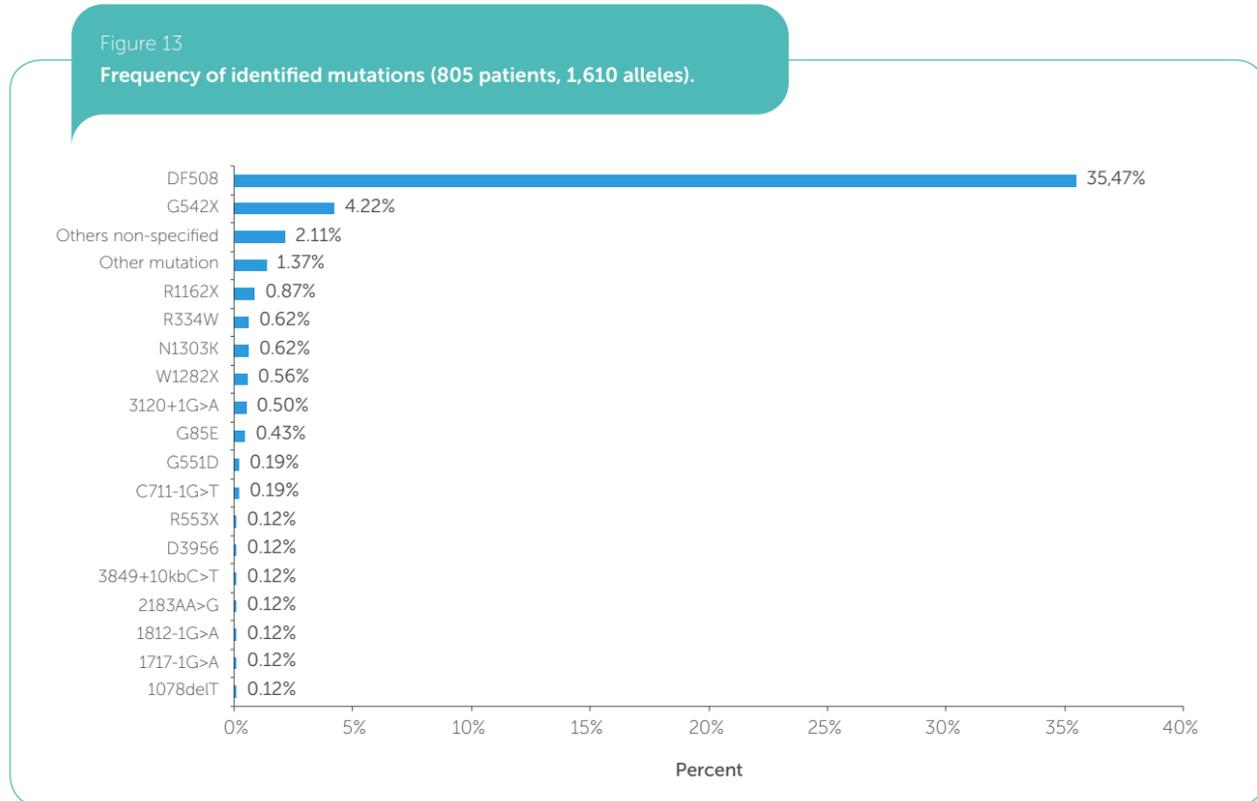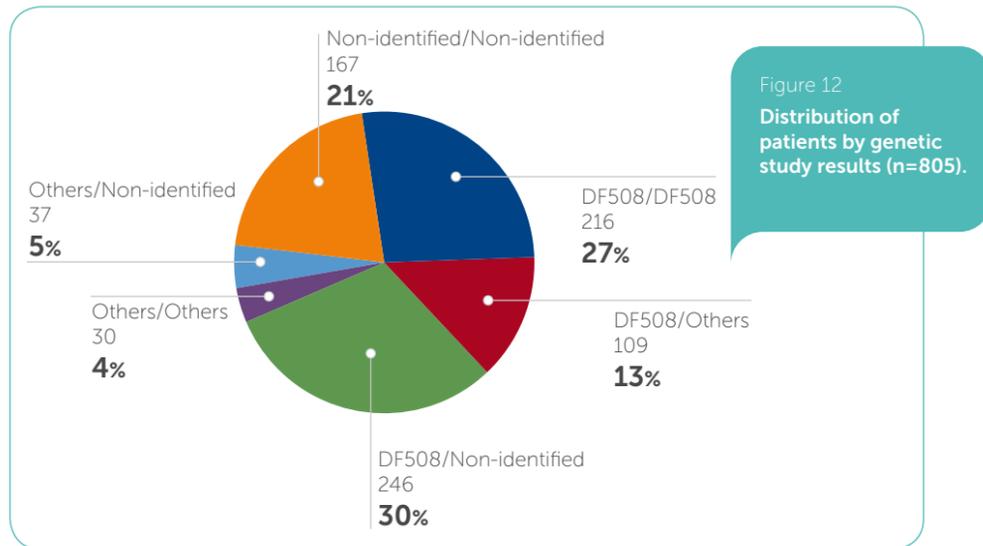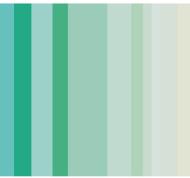| Genotype - description	n (%)
DF508/DF508	216 (26.8%)
DF508/Others	109 (6.1%)
DF508/Non-identified	246 (30.6%)
Others/ Others	30 (3.7%)
Others/ Non-identified	37 (4.6%)
Non-identified/Non-identified	167 (20.7%)
Total of patients with genetic testing reported	805 (100%)

Figure 12
Distribution of patients by genetic study results (n=805).

- Non-identified/Non-identified 167 — **21%**
- DF508/DF508 216 — **27%**
- DF508/Others 109 — **13%**
- DF508/Non-identified 246 — **30%**
- Others/Others 30 — **4%**
- Others/Non-identified 37 — **5%**

Figure 13
Frequency of identified mutations (805 patients, 1,610 alleles).

Mutation	Percent
DF508	35,47%
G542X	4.22%
Others non-specified	2.11%
Other mutation	1.37%
R1162X	0.87%
R334W	0.62%
N1303K	0.62%
W1282X	0.56%
3120+1G>A	0.50%
G85E	0.43%
G551D	0.19%
C711-1G>T	0.19%
R553X	0.12%
D3956	0.12%
3849+10kbC>T	0.12%
2183AA>G	0.12%
1812-1G>A	0.12%
1717-1G>A	0.12%
1078delT	0.12%

Percent

Table 16
Frequency of identified mutations (805 patients, 1,610 alleles).

Mutations	n	%	Mutations	n	%
DF508	571	35.47%	Y1092X	1	0.06%
G542X	68	4.22%	W543X*	1	0.06%
Other non-identified	34	2.11%	W1089X	1	0.06%
R1162X	14	0.87%	S549R	1	0.06%
R334W	10	0.62%	R75Q*	1	0.06%
N1303K	10	0.62%	R347P	1	0.06%
W1282X	9	0.56%	R10665*	1	0.06%
3120+1G>A	8	0.50%	Q220X*	1	0.06%
G85E	7	0.43%	PS4X*	1	0.06%
G551D	3	0.19%	P205S*	1	0.06%
C711-1G>T	3	0.19%	3659delc	1	0.06%
R553X	2	0.12%	I507	1	0.06%
D3956*	2	0.12%	I331N	1	0.06%
3849+10kbC>T	2	0.12%	D1152H	1	0.06%
2183AA>G	2	0.12%	c1929delC	1	0.06%
1812-1G>A	2	0.12%	C1172G>A	1	0.06%
1717-1G>A*	2	0.12%	2789+5G-A	1	0.06%
1078delT*	2	0.12%	Blank cells	830	51.55%

Total of alleles (805 patients)	1,610	100%

Names inserted by professionals and not verified for authenticity.

FOLLOW UP DATA

Follow up data contain only information of the year 2010.

ANTHROPOMETRIC DATA

Anthropometric data were obtained at the day of pulmonary function testing or in the last visit of the year (when pulmonary function testing data was not available).

Percentile distribution of anthropometric data and Z-score of weight and height was calculated by using CDC growth charts as reference (available in http://www.cdc.gov/growthcharts/).

Table 17
Anthropometric data

WEIGHT (kg)	Measure	NCHS Percentile	Z Score
Mean (standard deviation)	33.98 (18.75)	32.05 (28.83)	-0.73 (1.23)
Median (p25-p75)	30.00 (18.50-48.00)	25.00 (6.00-52.00)	-0.69 (-1.55- -0.04)
Minimum-Maximum	3.44-104.00	0-100	-3.96-3.74
Total of patients	1,385	1,086	1,086

HEIGHT (cm)	Measure	NCHS Percentile	Z Score
Mean (standard deviation)	132.51 (30.27)	33.11 (28.59)	-0.67 (1.15)
Median (p25-p75)	136.00 (111.00-158.00)	26.00 (7.00-56.00)	-0.65 (-1.48-0.14)
Minimum-Maximum	53.40-190.00	0-100	-3.96-3.24
Total of patients	1,371	1,023	1,023

IMC (kg/m2)	Measure	NCHS Percentile
Mean (standard deviation)	17.56 (3.60)	41.96 (32.13)
Median (p25-p75)	16.64 (15.09-19.39)	37.00 (13.00-70.00)
Minimum-Maximum	6.24-52.40	0-100
Total of patients	1,372	881

p25 = 25th percentile; p75 = 75th percentile.

Figure 14
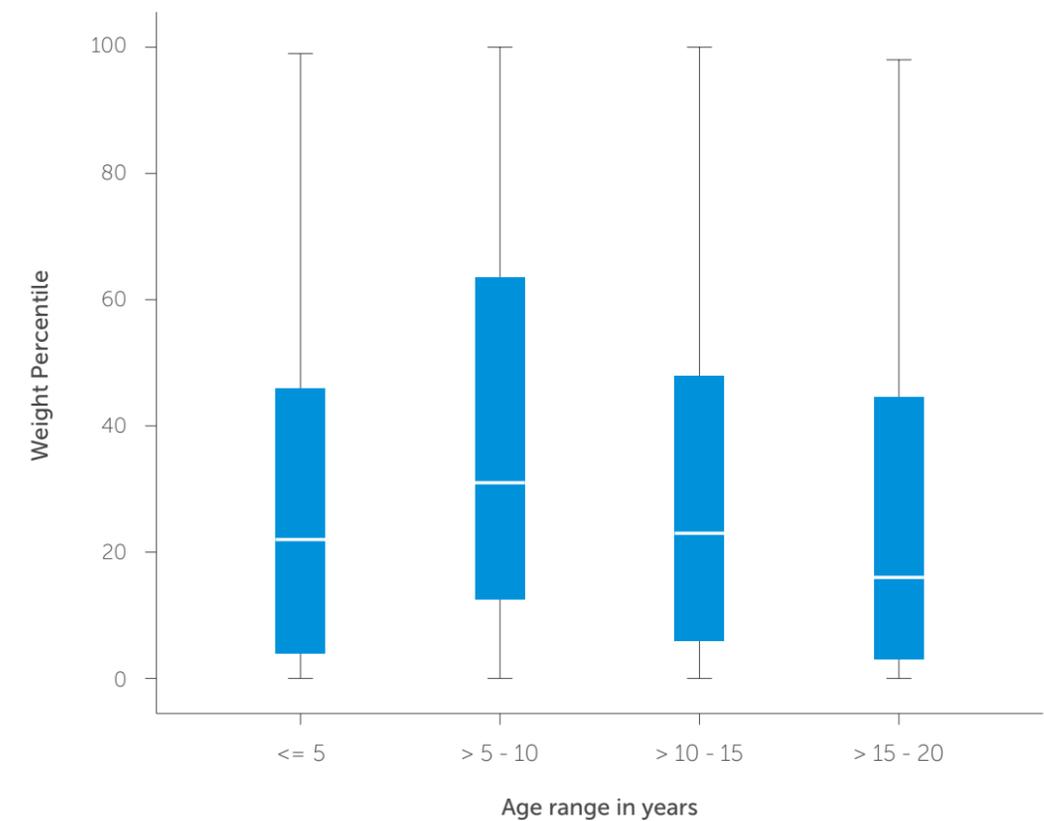**Box-plot graph showing distribution of NCHS percentile for weight by age group of the population aging up to 20 years old.**

Figure 15
Box-plot graph showing distribution of Z-score values for weight by age group of the population aged up to 20 years old.
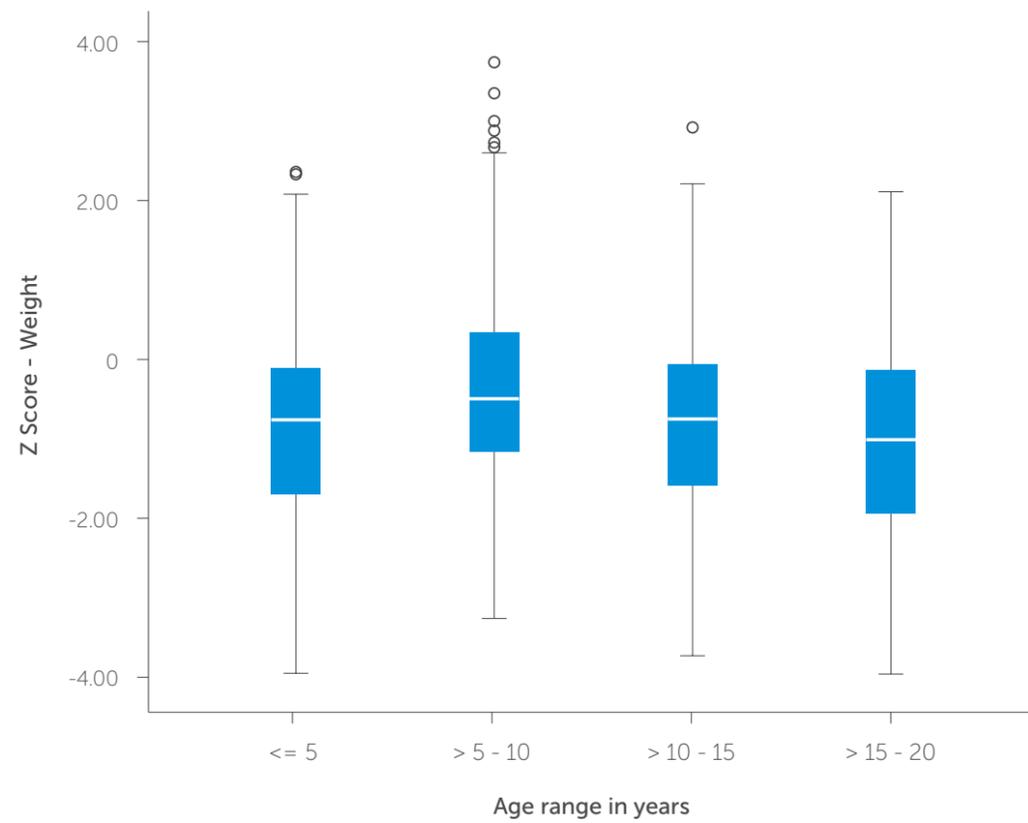
Figure 16
Box-plot graph showing distribution of NCHS percentile for height by age group of the population aging up to 20 years old.
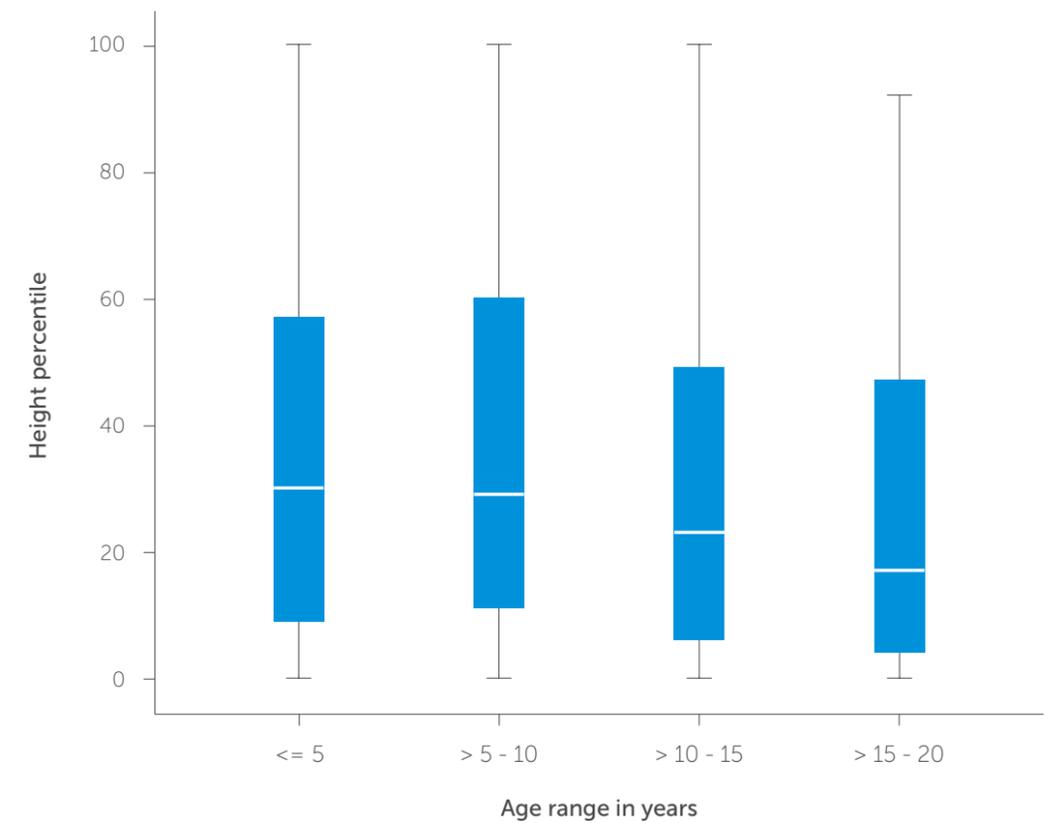
Figure 17
Box-plot graph showing distribution of Z-score values for height by age group of the population aged up to 20 years old.
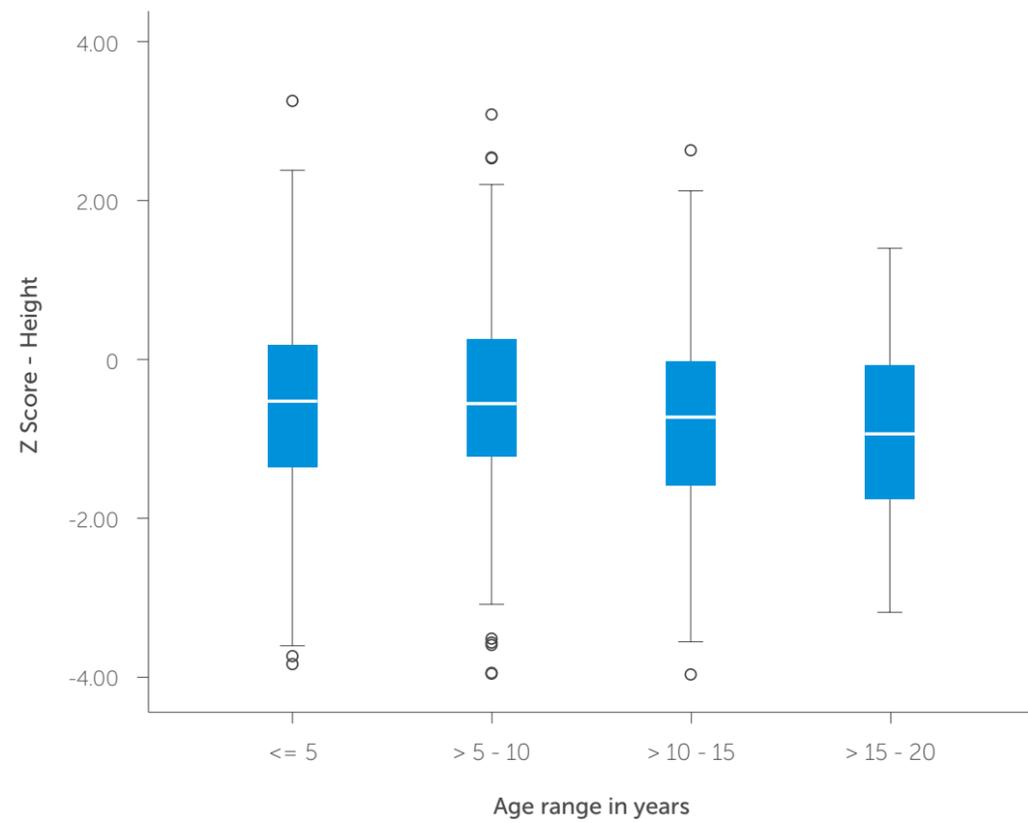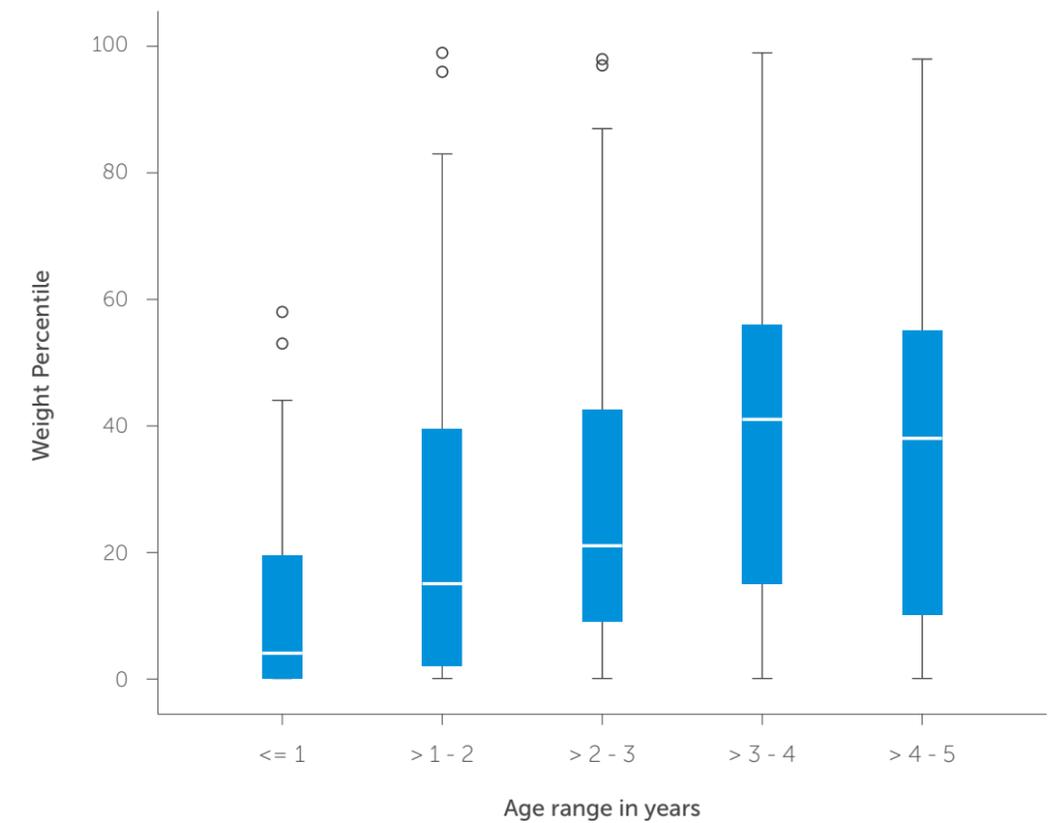

Figure 18
Box-plot graph showing distribution of NCHS percentile for weight by age group of infants and preschool age population.
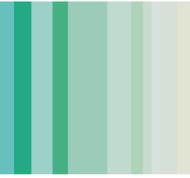
Figure 19
Box-plot graph showing distribution of Z-score values for weight by age group of infants and preschool age population.
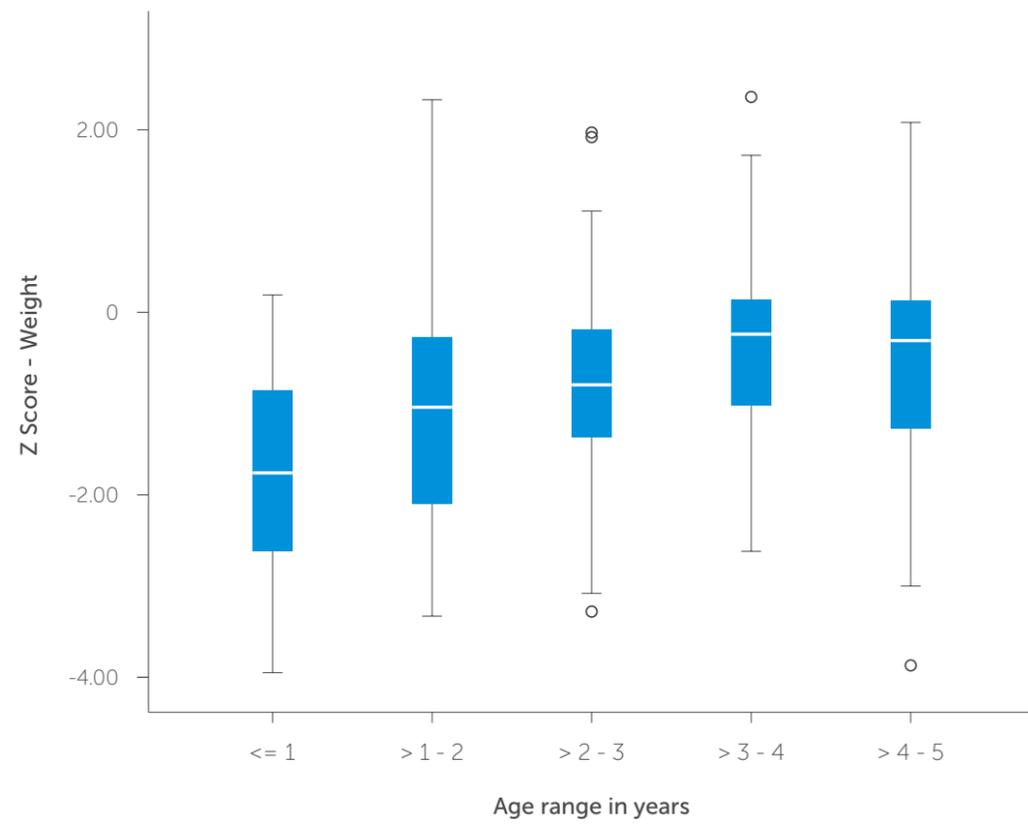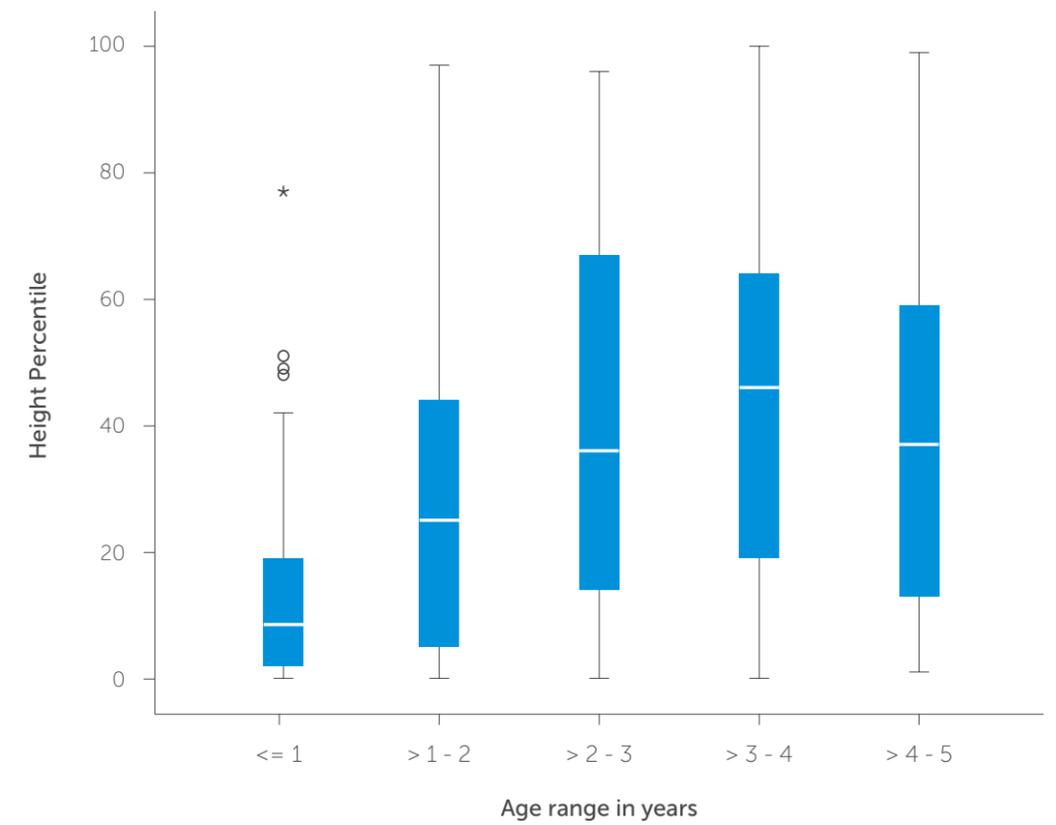

Figure 20
Box-plot graph showing distribution of NCHS percentile for height by age group of infants and preschool age population.
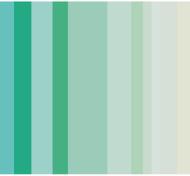
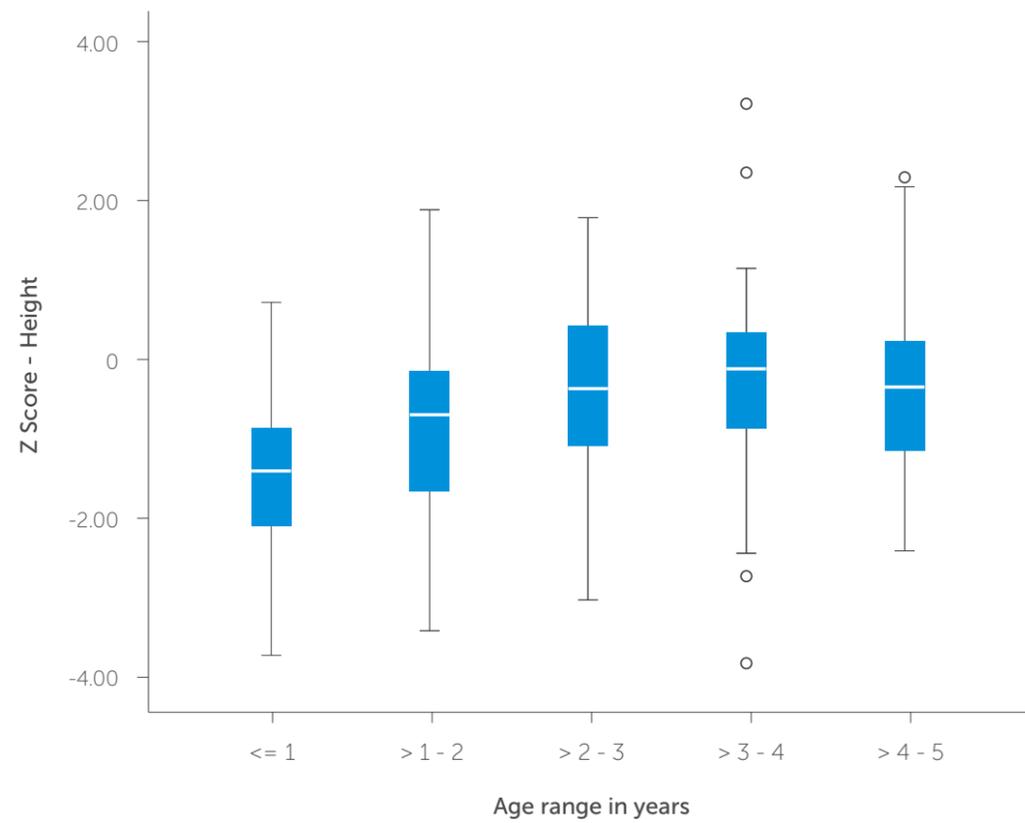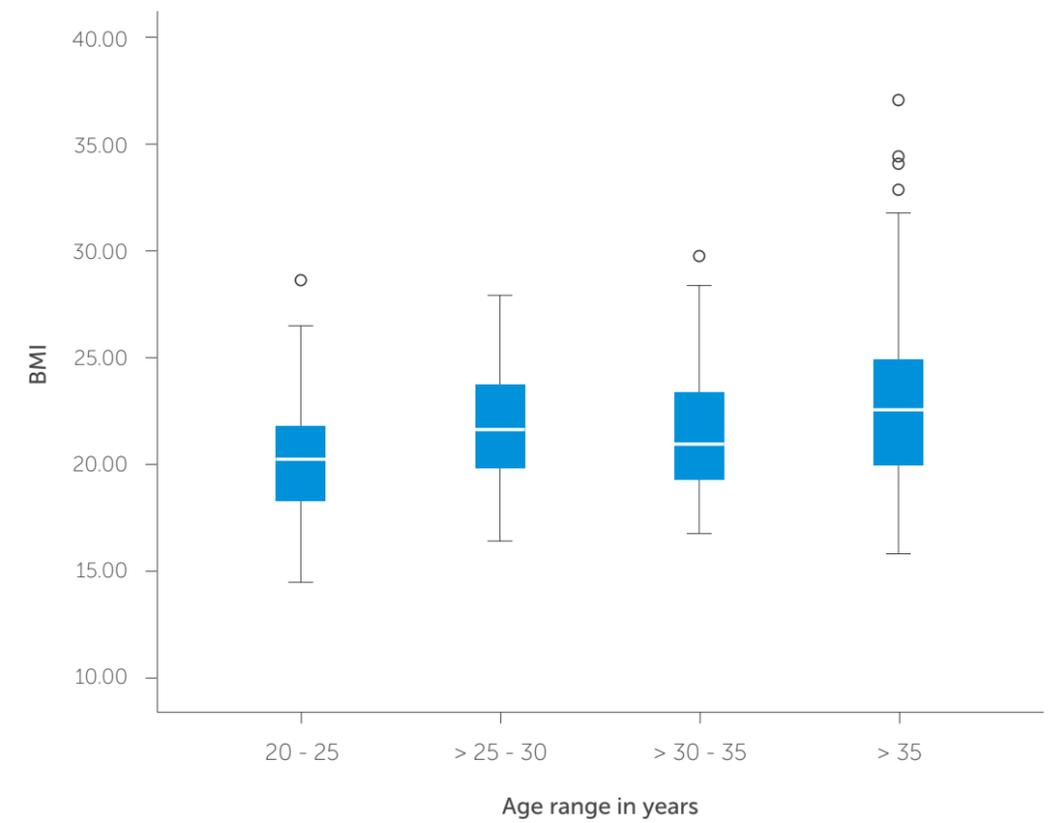**Box-plot graph showing distribution of Z-score values for height by age group of infants and preschool age population.**

Box-plot graph showing distribution of Z-score values for BMI (Body Mass Index) by age group of the adult population.

PULMONARY FUNCTION DATA

The values of FVC, FEV1 and FVC/FEV1 recorded by the participants were those obtained in the best lung function test of the reported year. The predicted values of pulmonary function were obtained from the publication of *Stanojevic S et al, Spirometry Centile Charts for Young Caucasian Children: The Asthma UK Collaborative Initiative. American Journal of Respiratory and Critical Care Medicine 2009, 180(6); 547-552.*

Table 18
Pulmonary function data.

Spirometry performed	n (%)
No	716 (49.7%)
Yes	724 (50.3%)
Total of patients	1,440 (100%)

FVC (liters)	
Mean (standard deviation)	2.37 (1.02)
Median (p25-p75)	2.18 (1.60-2.96)
Minimum-Maximum	0.44-5.79
Total of patients	711

FEV1 (liters)	
Mean (standard deviation)	1.80 (0.82)
Median (p25-p75)	1.61 (1.19-2.27)
Minimum-Maximum	0.29-4.88
Total of patients	711

FEV1/FVC	
Mean (standard deviation)	0.77 (0.14)
Median (p25-p75)	0.78 (0.68-0.87)
Minimum-Maximum	0.35-1.77
Total of patients	711

n=number of patients; p25 = 25th percentile; p75 = 75th percentile. FVC: forced vital capacity; FEV1: Forced expiratory volume in the 1st second.

Figure 23
Box-plot graph showing distribution of percent of predicted values of forced vital capacity by age group.
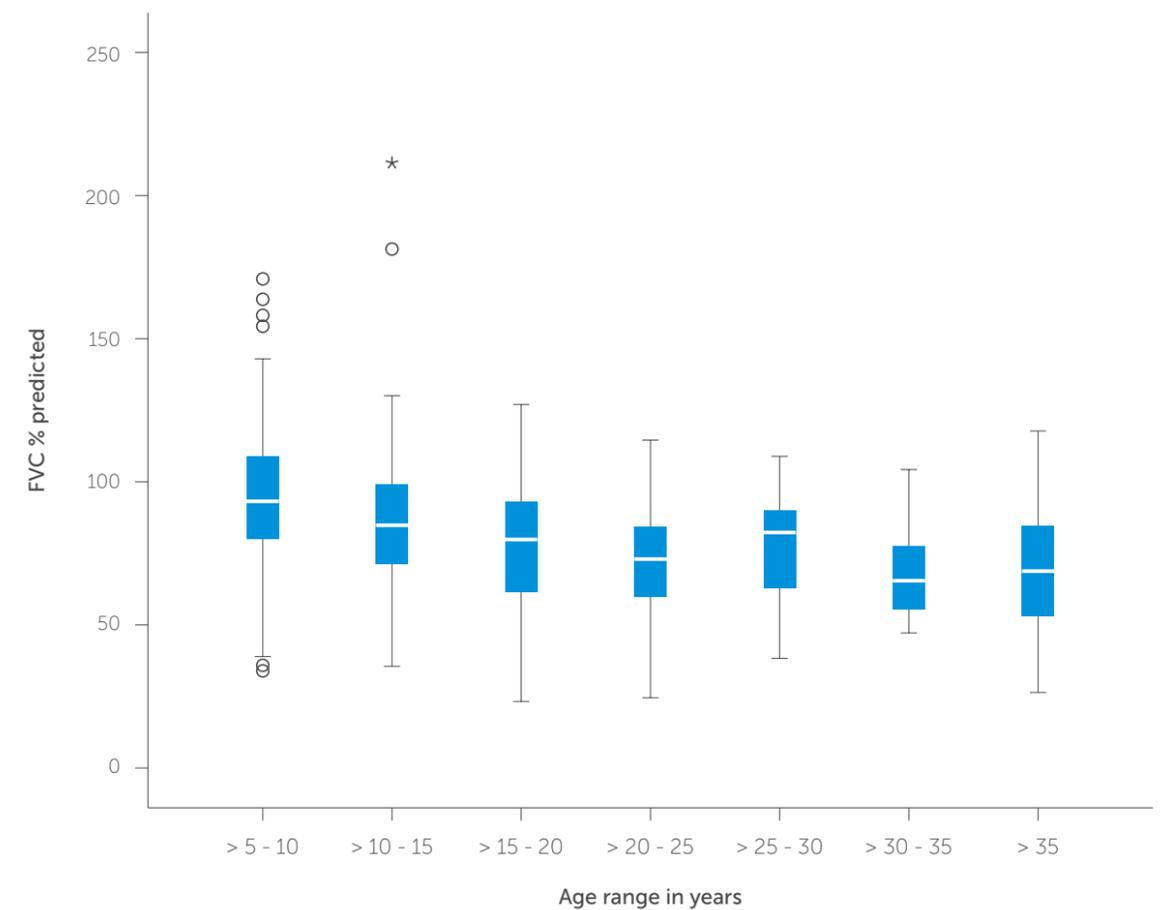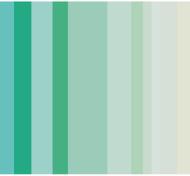
Figure 24

Box-plot graph showing distribution of percent of predicted values of forced expiratory volume in the 1st second by age group.
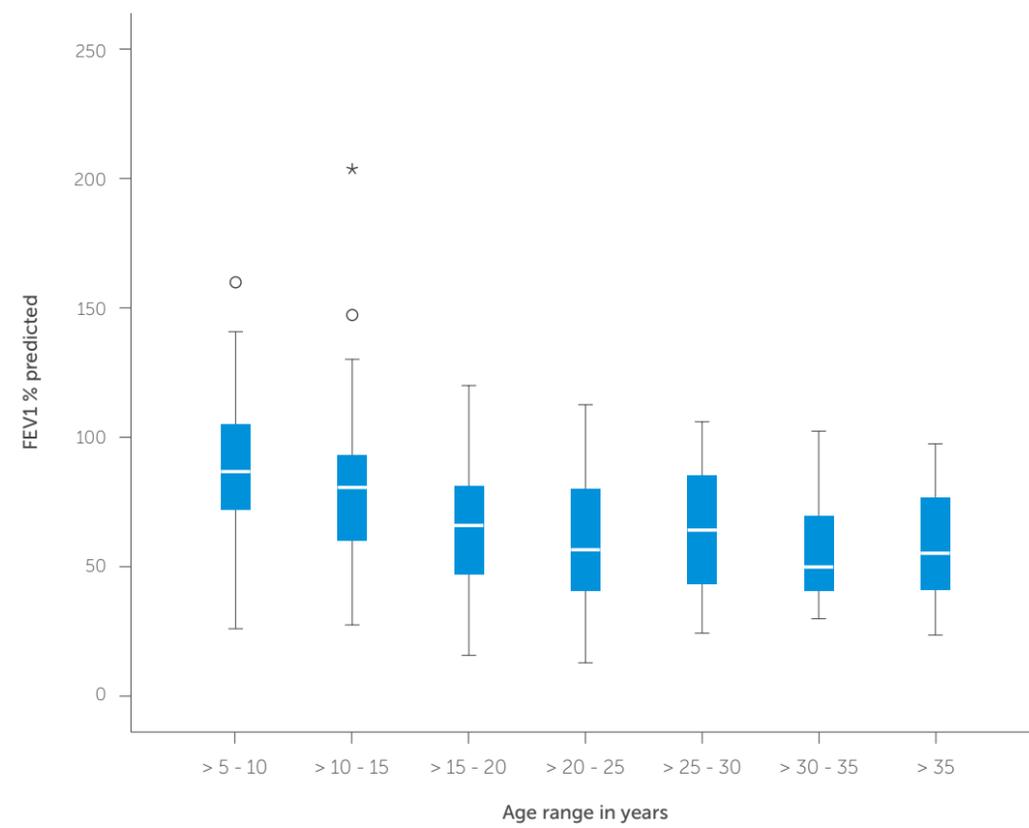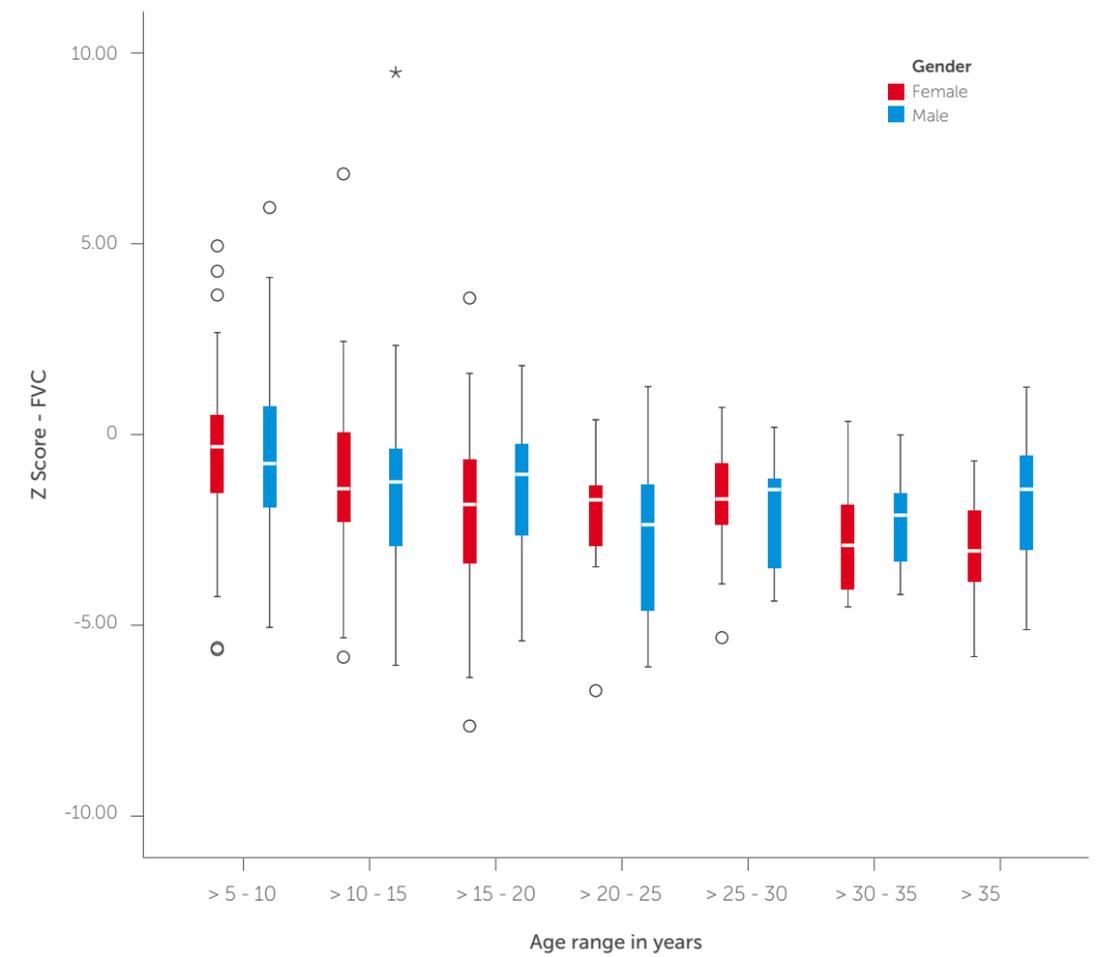

Figure 25

Box-plot graph showing distribution of Z-score values of forced vital capacity by age group and gender.
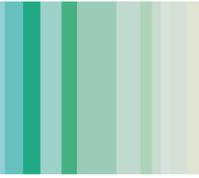
Figure 26

Box-plot graph showing distribution of Z-score values of forced expiratory volume in the 1st second by age group and gender.
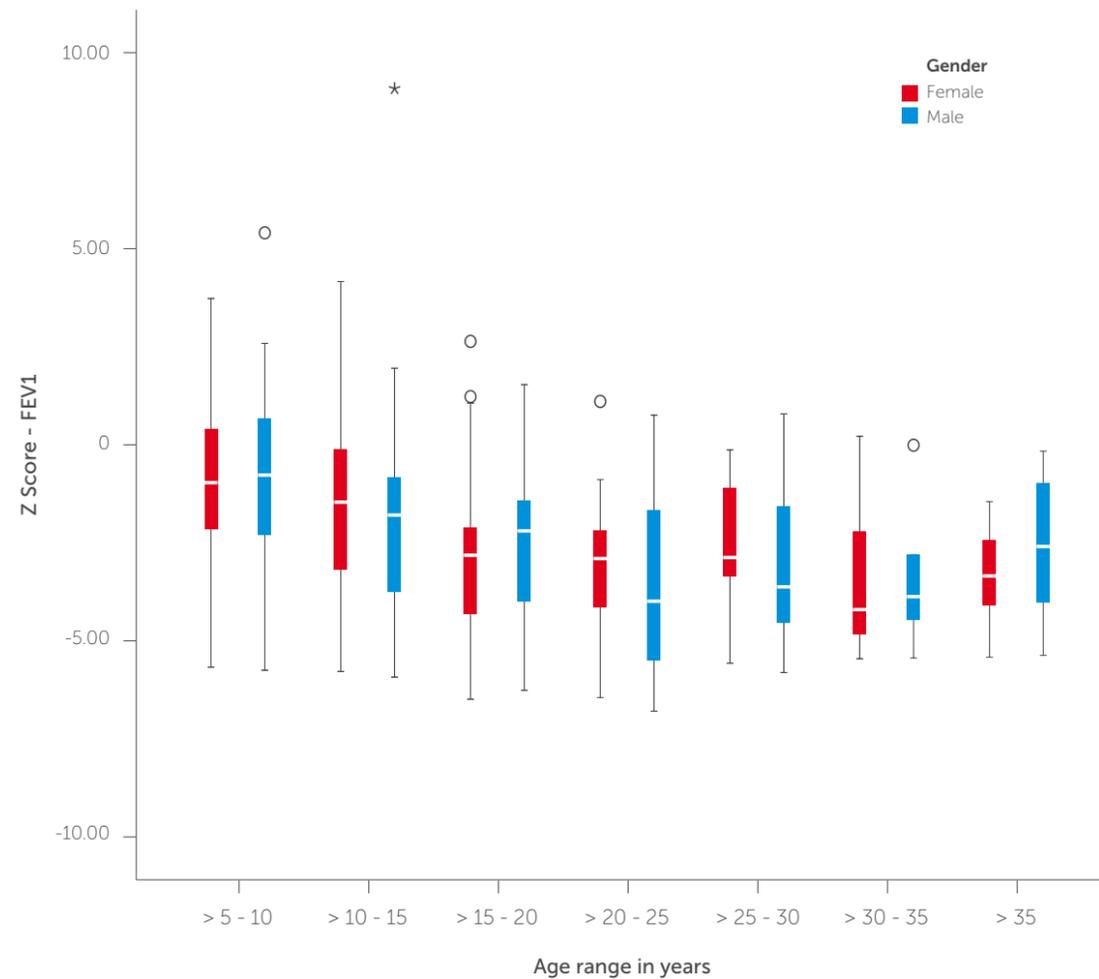
MICROBIOLOGY DATA

Microbiology data describe positive results for the respiratory pathogen at least once in the given follow-up year; since there is not a standardization of microbiology processing of respiratory tract samples of cystic fibrosis patients in our country, these data have to be cautiously interpreted.

Table 19

Description of microorganisms identified.

Microorganisms identified	n	%
Methicillin-sensitive *Staphylococcus aureus*	803	55.8%
Pseudomonas aeruginosa	715	49.7%
Non-mucoid *Pseudomonas aeruginosa*	496	34.4%
Mucoid *Pseudomonas aeruginosa*	391	27.2%
Burkholderia cepacia complex	147	10.2%
Methicillin-resistant *Staphylococcus aureus*	134	9.3%
Haemophilus influenzae	91	6.3%
Stenotrophomonas maltophilia	74	5.1%
Klebsiella pneumoniae	62	4.3%
Serratia sp.	56	3.9%
Achromobacter sp.	39	2.7%
Candida sp.	32	2.2%
Aspergillus fumigatus	27	1.9%
Escherichia coli	26	1.8%
Other *Pseudomonas*	21	1.5%
Non tuberculous *Mycobacteria*	6	0.4%
Mycobacterium tuberculosis	3	0.2%
Total of patients	1,440	100%

n = number of patients

Figure 27
Microorganisms identified

Microorganism	Percentage
Methicillin-sensitive *Staphylococcus aureus*	55.8%
Non-mucoid *Pseudomonas aeruginosa*	34.4%
Mucoid *Pseudomonas aeruginosa*	27.2%
Burkholderia cepacia complex	10.2%
Methicillin-resistant *Staphylococcus aureus*	9.3%
Haemophilus influenzae	6.3%
Stenotrophomonas maltophilia	5.1%
Klebsiella pneumoniae	4.3%
Serratia sp.	3.9%
Achromobacter sp.	2.7%
Candida sp	2.2%
Aspergillus fumigatus	1.9%
Escherichia coli	1.8%
other *Pseudomonas*	1.5%
Mycobacterium não tuberculosis	0.4%
Mycobacterium tuberculosis	0.2%

Table 20
Microorganisms identified by age group

	Microorganisms identified						
Age group	Methicillin-sensitive *S. aureus*	*Pseudomonas aeruginosa*	*Burkholderia cepacia* complex	Methicillin-resistant *S. aureus*	*Haemophilus influenzae*	*Stenotrophomonas maltophilia*	n
Up to 5 years	54.51%	45.14%	11.46%	10.76%	9.03%	3.47%	288
> 5 to 10	63.17%	42.46%	9.21%	7.67%	8.18%	4.86%	391
>10 to 15	62.09%	50.00%	12.75%	8.17%	6.54%	7.19%	306
>15 to 20	53.30%	54.95%	9.89%	14.29%	5.49%	6.04%	182
>20 to 25	46.51%	59.30%	8.14%	12.79%	0.00%	3.49%	86
>25 to 30	38.78%	57.14%	12.24%	8.16%	2.04%	2.04%	49
>30 to 35	40.00%	77.14%	0.00%	0.00%	2.86%	8.57%	35
>35 years	37.10%	67.74%	4.84%	4.84%	0.00%	3.23%	62
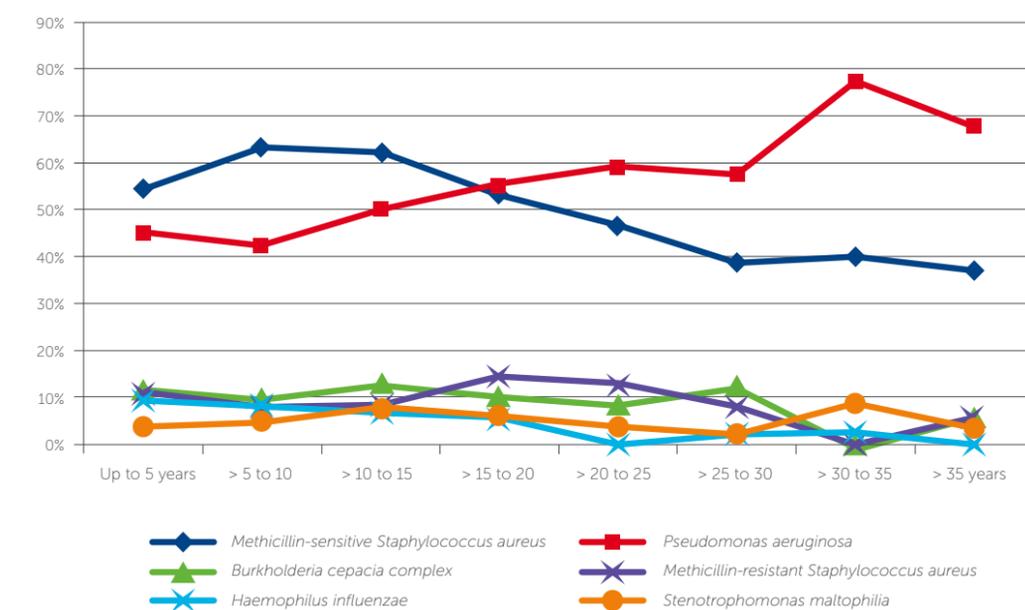
Figure 28
Prevalence of identified pathogens by age group.

Legend:
— Methicillin-sensitive *Staphylococcus aureus*
— *Pseudomonas aeruginosa*
— *Burkholderia cepacia* complex
— Methicillin-resistant *Staphylococcus aureus*
— *Haemophilus influenzae*
— *Stenotrophomonas maltophilia*

CLINICAL TREATMENT DATA

Figure 29
Distribution of the number of consultations per patient in 2010.
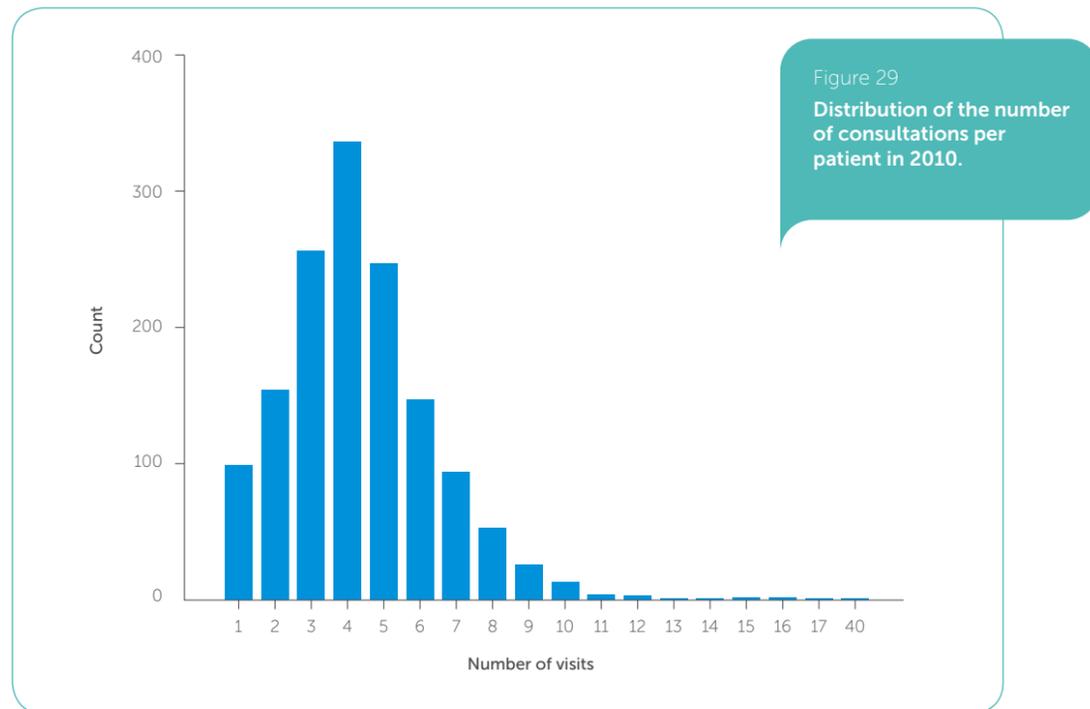
Table 21
Deaths

Death	n (%)
No	1,432 (99.4%)
Yes	8 (0.6%)
Causes of death	
Respiratory failure	5
Subaracnoid bleeding, respiratory failure	1
Cardiorespiratory failure	1
Car accident	1
Total of patients	1,440 (100%)

Age at death (years)	
Mean (standard deviation)	17.94 (12.03)
Median (p25-p75)	19.81 (7.21-25.54)
Minimum-Maximum	1.33-37.05

Table 22
Shwachman-Kulczycki score.

Total score	n (%)
Mean (standard deviation)	79.71 (18.56)
Median (p25-p75)	85 (70-95)
Minimum-Maximum	20-100
CLASSIFICATION	
Severe (≤ 40)	66 (4.6%)
Moderate (41 a 55)	107 (7.4%)
Median (56 a 70)	243 (16.9%)
Good (71 a 85)	431 (29.9%)
Excellent (86-100)	593 (41.2%)
Total of patients	1,440 (100%)

n = number of patients

Figure 30
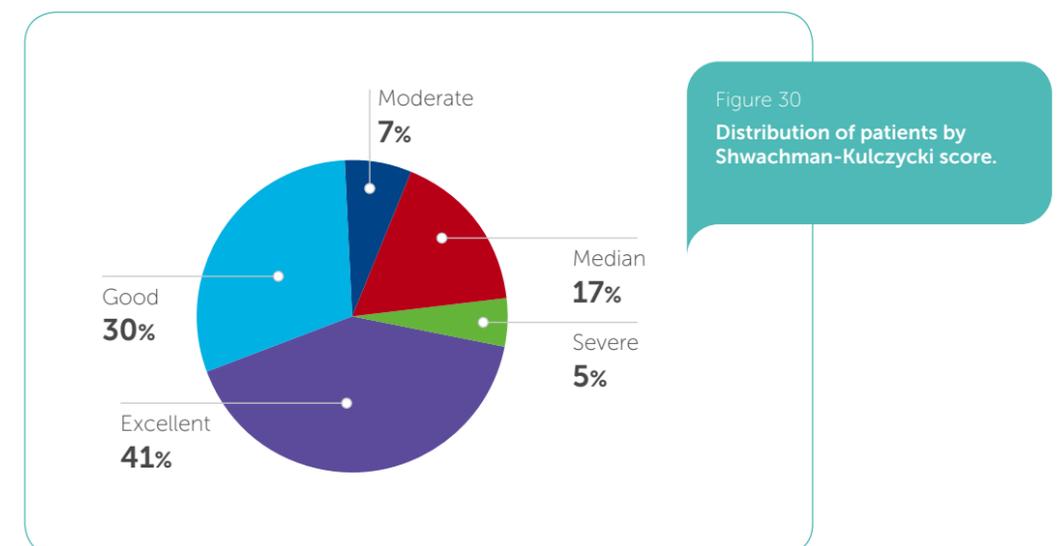**Distribution of patients by Shwachman-Kulczycki score.**

Table 23

Shwachman-Kulczycki score: Total score by age group.

| Total score	Up to 5 anos	> 5 to 10	>10 to 15	>15 to 20	>20 years	Total
Severe (≤ 40)	2 (0.7%)	5 (1.3%)	5 (1.6%)	16 (8.8%)	26 (11.2%)	54 (3.9%)
Moderate (41 a 55)	5 (1.7%)	13 (3.3%)	25 (8.2%)	24 (13.2%)	37 (15.9%)	104 (7.4%)
Median (56 a 70)	29 (10.1%)	53 (13.6%)	66 (21.6%)	41 (22.5%)	50 (21.6%)	239 (17.1%)
Good (71 a 85)	76 (26.4%)	122 (31.2%)	108 (35.3%)	48 (26.4%)	64 (27.6%)	418 (29.9%)
Excellent (86-100)	176 (61.1%)	198 (50.6%)	102 (33.3%)	53 (29.1%)	55 (23.7%)	584 (41.7%)
Total of patients	288 (100%)	391 (100%)	306 (100%)	182 (100%)	232 (100%)	1399* (100%)

* 41 patients without information.
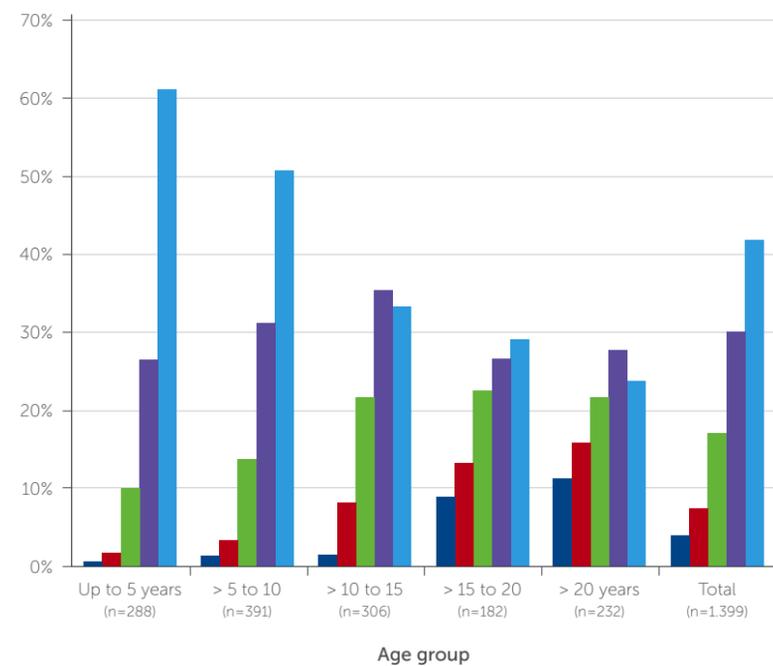
Figure 31

Bar graph showing distribution of Shwachman-Kulczycki score by age group.

Figure 32

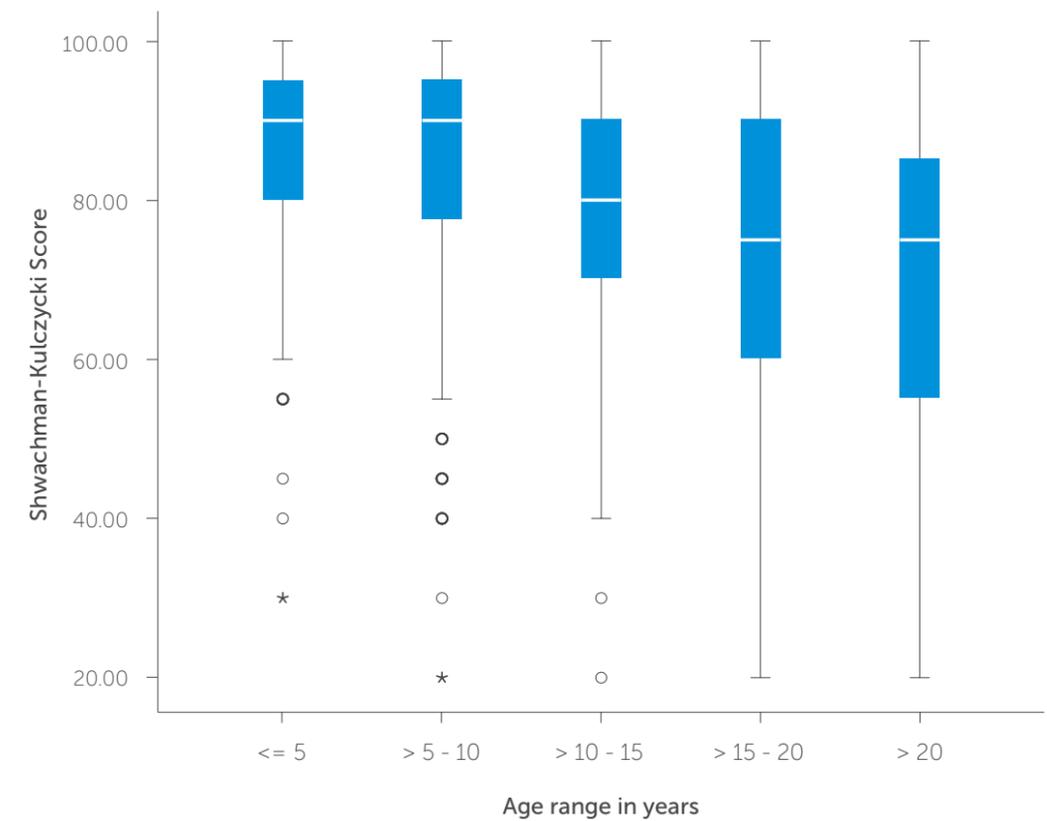**Box-plot graph showing distribution of Shwachman-Kulczycki score by age group.**

44

45

Figure 33
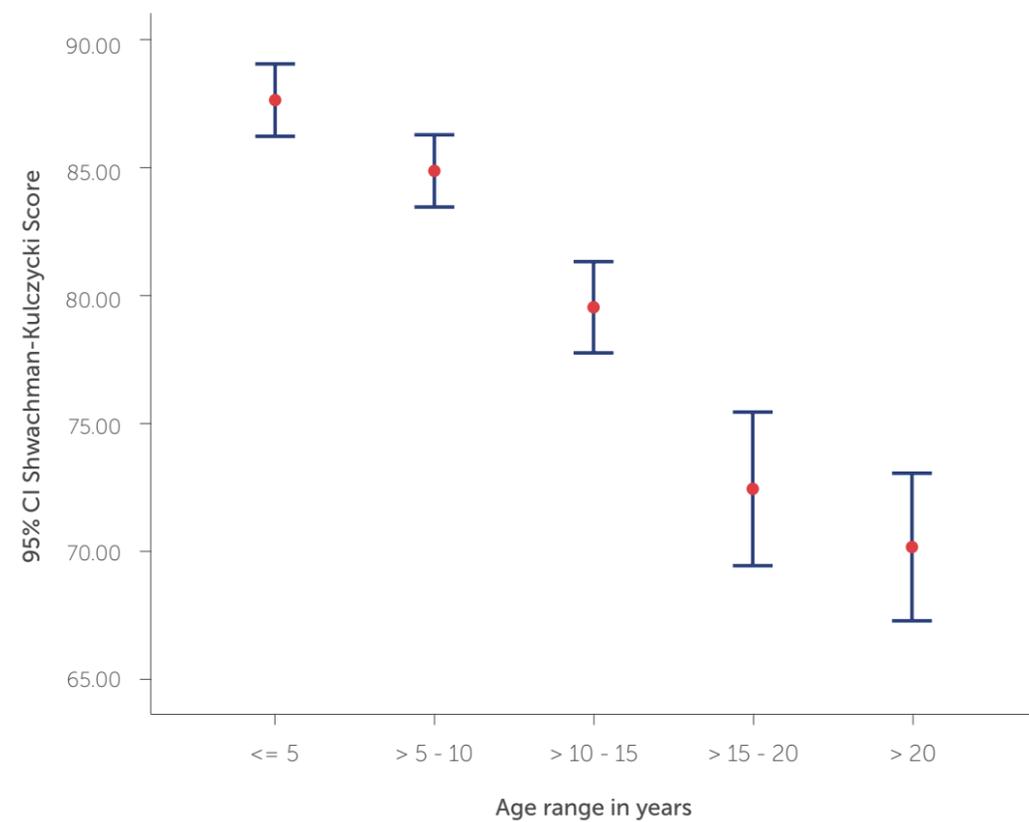**Graph showing 95% confidence interval values of Shwachman-Kulczycki score by age group.**

Table 24
Complications in the given year (2010)

Complications in 2010	n (%)
Asthma	198 (13.75%)
Gastroesophageal reflux	110 (7.64%)
Evidences of hepatic disease	106 (7.36%)
Nasal polyposis	60 (4.17%)
Hemoptysis	44 (3.06%)
Diabetes	43 (2.99%)
Osteopenia / Osteoporosis	26 (1.81%)
Chronic atelectasis	23 (1.6%)
Allergic broncopulmonary aspergillosis	15 (1.04%)
Distal intestinal obstruction	14 (0.97%)
Colelythiasis	13 (0.9%)
Pulmonary hypertension	13 (0.9%)
Cirrosis with portal hypertension	9 (0.63%)
Pneumothorax	6 (0.42%)
Pancreatitis	5 (0.35%)
Hematemesis	1 (0.07%)
Total of patients	1,440 (100%)

Table 25
Transplantion.

Transplantation	n (%)
Pulmonary transplantation	
Corpse	6 (0.4%)
Live donor	7 (0.5%)
Liver transplantation	3 (0.2%)
Total de pacientes	1,440 (100%)

Table 26
Oxigen therapy

Oxigen therapy	n (%)
No	1,385 (96.2%)
Yes	55 (3.8%)
Continuous	31 (2.2%)
Nocturnal	24 (1.7%)
Total of patients	1,440 (100%)

Table 27
Insulin

Insulin usage	n (%)
No	1,381 (95.9%)
Yes	59 (4.1%)
Total of patients	1,440 (100%)

n = number of patients.
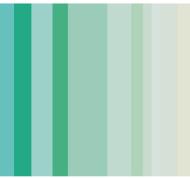
Table 28
Inhaled medications

Bronchodilators	n (%)
Short acting Beta 2 agonist	438 (30.4%)
Long acting Beta 2 agonist	267 (18.5%)
Anticholinergic	28 (1.9%)

Antibiotics	n (%)
Colomycin	423 (29.38%)
Inhaled Tobramycin solution 300mg	418 (29.03%)
Gentamycin	41 (2.85%)
Others	33 (2.29%)
Amikacin	15 (1.04%)
Vancomycin	5 (0.35%)
Injectable Tobramicyn solution	4 (0.28%)

Mucolitics	n (%)
Alfa dornase	1028 (71.4%)
N Acetylcystein	43 (3.0%)

Saline solutions	n (%)
0.9% saline solution	410 (28.5%)
Hypertonic saline 3%	38 (2.6%)
Hypertonic saline 5%	38 (2.6%)
Hypertonic saline 7%	236 (16.4%)

Total of patients	1,440 (100%)

n = number of patients.

Table 29
Oral medications

	n (%)
Pancreatic enzymes	1,115 (77.43%)
Less than 5.000 U/kg/dia	373
5.000 - 10.000 U/kg/dia	488
More than 10.000 U/kg/dia	196
Unknown	58
Dietary supplements	862 (59.86%)
Oral	821
Gastrostomy	34
Gastric tubes	5
Unknown	2

	n (%)
Azithromycin	496 (34.44%)
Ursodeoxycholic acid	313 (21.74%)
Proton pump inhibitors	201 (13.96%)
Corticosteroid	148 (10.28%)
H2 blockers	130 (9.03%)
Ibuprofen (for lung disease)	8 (0.56%)
Ibuprofen or other NSAI* (for arthropathy)	5 (0.35%)

Total of patients	1,440 (100%)

n= number of patients
* Non-steroidal anti-inflammatory
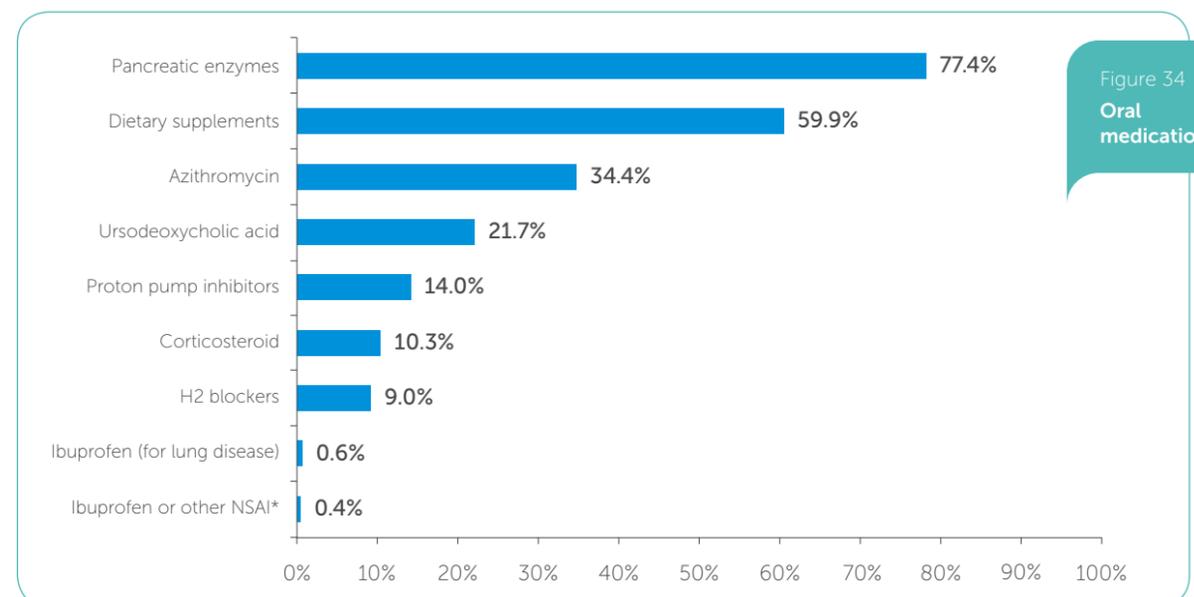
Figure 34
Oral medications

	%
Pancreatic enzymes	77.4%
Dietary supplements	59.9%
Azithromycin	34.4%
Ursodeoxycholic acid	21.7%
Proton pump inhibitors	14.0%
Corticosteroid	10.3%
H2 blockers	9.0%
Ibuprofen (for lung disease)	0.6%
Ibuprofen or other NSAI*	0.4%

Table 30
P. aeruginosa eradication treatment

P. aeruginosa eradication treatment	n (%)
Yes	402 (27.9%)
No	586 (40.7%)
Unknown	452 (31.4%)
Total of patients	1,440 (100%)

n = number of patients

Table 31
Intravenous treatments - admissions

Treatment	n (%)
No admission	1,074 (74.6%)
Home care	28 (1.9%)
Hospital admission	334 (23.2%)
Hospital and home care admission	4 (0.3%)
Total of patients	1,440 (100%)

Cycles	
Mean (standard deviation)	1.46 (1.05)
Median (p25-p75)	1 (1-2)
Minimum-Maximum	1-11
Total of patients	328

Days	
Mean (standard deviation)	25.17 (29.12)
Median (p25-p75)	15 (14-25)
Minimum-Maximum	2-365
Total of patients	333

Implanted cathether	n (%)
No	1,411 (98.0%)
Yes	29 (2.0%)
Total of patients	1,440 (100%)

n = number of patients

Table 32
Intravenous antibiotics: days of treatment by age group.

Days	Up to 5 years	> 5 to 10	>10 to 15	>15 to 20	>20 years	Total
			Age group			
Mean (standard deviation)	25.4 (23.0)	20.3 (18.0)	28.6 (47.6)	29.2 (24.7)	23.6 (17.6)	25.3 (29.3)
Median (p25-p75)	15 (14-27)	15 (14-21)	15 (14-21.5)	19.5 (15-29)	17.5 (14-28)	15 (14-25)
Minimum-Maximum	3-120	2-131	7-365	11-122	3-109	2-365
Total of patients	69	70	76	50	62	327

Table 33
Intravenous antibiotics – drugs utilized.

Drugs utilized	n	(%)	Drugs utilized	n	(%)
Ceftazidime	249	17.3%	Piperaciline/Tazobactam	21	1.5%
Amikacin	222	15.4%	Linezolid	13	0.9%
Oxacillin	132	9.2%	Ticarcilina/Piperacilina	12	0.8%
Tobramycin	69	4.8%	Cefuroxime	8	0.6%
Vancomycin	63	4.4%	Colomycin	6	0.4%
Imipenem or Meropenem	58	4.0%	Aztreonam	4	0.3%
Ciprofloxacin	41	2.8%	Gentamicin	4	0.3%
Trimethoprim-sulfamethoxazole	37	2.6%	Chloramphenicol	3	0.2%
Cefepime	32	2.2%	Others	29	2.0%

Total of patients	1,440	100%

n=number of patients.
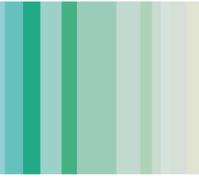
Figure 35
Intravenous antibiotics – drugs utilized.

Drug	Percentage
Ceftazidime	17.3%
Amikacin	15.4%
Oxacillin	9.2%
Tobramycin	4.8%
Vancomycin	4.4%
Imipenem - Meropenem	4.0%
Ciprofloxacin	2.8%
Trimethoprim-sulfamethoxazole	2.6%
Cefepime	2.2%
Others	2.0%
Piperaciline/Tazobactam	1.5%
Linezolid	0.9%
Ticarcilina/Piperacilina	0.8%
Cefuroxime	0.6%
Colomycin	0.4%
Gentamicin	0.3%
Aztreonam	0.3%
Chloramphenicol	0.2%
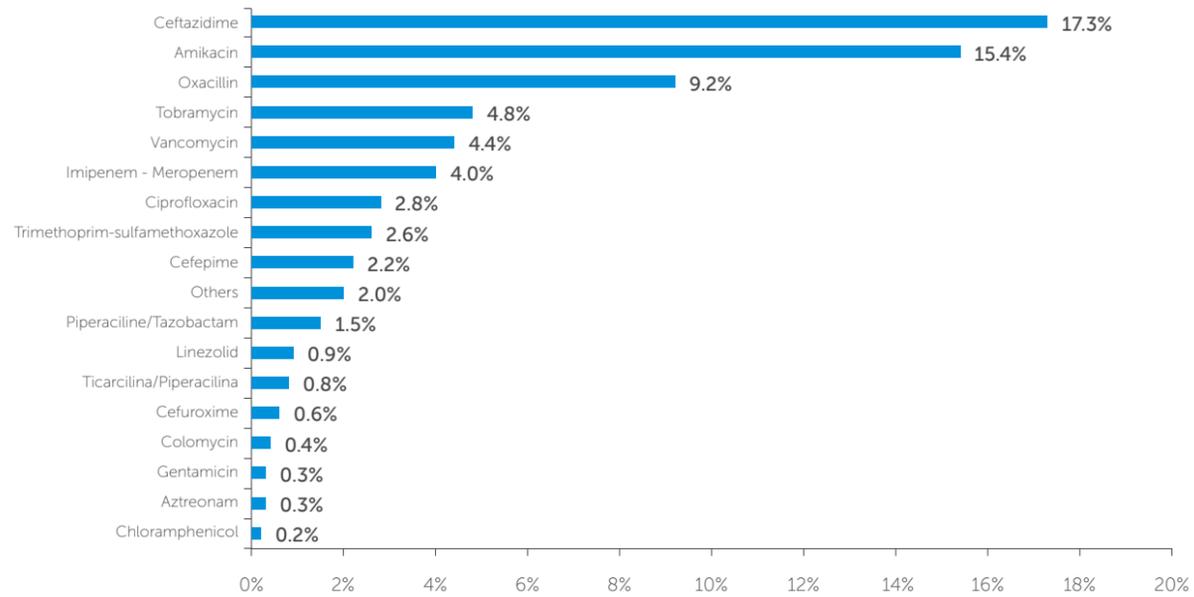
Table 34
Data of adult population.

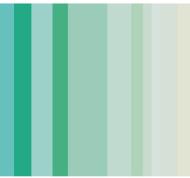|	
Azoospermia or Hypospermia	19 (6.6%)
Pregnancy	5 (1.7%)
Common law marriage	66 (23.1%)
Employment	114 (39.9%)
Total of patients older than 18 years with follow-up data	286

Acknowledgements:

Centers with confidentiality contract celebrated with the GBEFC (updated in Oct/2012)

Name	City	State	Responsible
Hospital Infantil Pequeno Príncipe	Curitiba	PR	Paulo Kussek
Hospital Especializado Otávio Mangabeira	Salvador	BA	Maria Angélica Santana
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Hospital da UNIFESP	São Paulo	SP	Sônia Mayumi Chiba
Faculdade de Medicina da USP de Ribeirão Preto	Ribeirão Preto	SP	Lídia Alice Gomes M. M. Torres
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Hospital das Clínicas da UFGO – (adultos)	Goiânia GO	GO	Maria Rosedália de Moraes
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Instituto Fernandes Figueira	Rio de Janeiro	RJ	Laurinda Yoko Shinzato Higa
Hospital de Base da Fac. de Medicina de São José do Rio Preto	São José do Rio Preto	SP	Kátia Izabel de Oliveira e Rafaela M. Pereira Martins

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Hospital Santa Isabel	Blumenau	SC	Glaunir Maria Foletto
Hospital Universitário Maria Aparecida Pedrossian	Campo Grande	MS	Valéria Cristina de Ruchkys e Lílian Cristina Ferreira Andries
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Hospital Infantil Jeser Amarante Faria	Joinville	SC	Tiago Neves Veras e Rafaela de Campos Benvenutti da Costa
Hospital Universitário do Oeste do Paraná	Cascavel	PR	Mafalda Lúcia Kuhn
Hospital Universitário Pedro Ernesto – UERJ	Rio de Janeiro	RJ	Mônica de Cássia Firmida
Hospital da Criança de Brasília – Hospital de Base	Brasília	DF	Luciana de Freitas Velloso Monte
Hospital da Universidade Federal da Paraíba	João Pessoa	PB	Constantino Giovanni Braga Cartaxo
Hospital dos Servidores Públicos do Estado do Rio de Janeiro	Rio de Janeiro	RJ	Daniela de Souza Paiva Borgli e Maria da Glória Mello
Hospital das Clinicas da UNICAMP (adultos)	Campinas	SP	Ilma Aparecida Paschoal e Mônica Corso Pereira
Hospital das Clínicas da USP (adultos)	São Paulo	SP	Rafael Stelmach
Hospital São Lucas da PUC	Porto Alegre	RS	Paulo José Cauduro Maróstica
Hospital das Clínicas da UFPR (adultos)	Curitiba	PR	Mariane Gonçalves Martynychen Canan
Universidade Federal de Campina Grande	Campina Grande	PB	Marta Lúcia de Albuquerque
Hospital das Clínicas da UFU	Uberlândia	MG	Mara Lícia Machado Antunes
Hospital das Clínicas da UFGO	Goiânia	GO	Lusmaia Damaceno Camargo Costa
Centro de Puericultura –CPAP	São Paulo	SP	Luiz Vicente R. F. da Silva Filho
Consultório Fabíola Adde	São Paulo	SP	Fabíola Villac Adde