2014

ECFS Patient Registry

Annual Data Report

European Cystic Fibrosis Society
Kastanieparken 7
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Denmark

ECFS Patient Registry

Annual Data Report

2014 data

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Preface

We are delighted to share with you the 2014 Annual Report from the European Cystic Fibrosis Society Patient Registry (ECFSPR). This report contains epidemiological data from national cystic fibrosis (CF) registries and individual CF centres throughout Europe and neighbouring countries. It is the eighth official report, and includes demographic and clinical data of 35,582 consenting CF patients from 26 countries.

In January 2014, we introduced a new software platform: ECFSTracker. The transition to this new software has taken some time and this has delayed the production of the 2011 and 2012 reports. Reports for the 2011 and 2012 data will be published in electronic format in the coming months.

The publication of the 2014 report 20 months after the end of the data-collection year, reflects our development plan to publish the annual reports within 18 months of the close of the calendar year, ideally in time for the ECFS Conference in June. Moreover, it is our objective to encourage the use of the encounter-based component in ECFSTracker. We hope that, over time, the ability to enter encounter-based data, thereby capturing clinical interaction in real time, may be of value to CF clinicians as well as ensure a faster and more efficient collection of data. More information about the ECFSTracker software you will find on the webpage www.ecfs.eu/ecfspr-software.

The primary goal of the ECFSPR is to allow comparison between CF clinical outcomes across Europe. The analysis presented in this report has been carried out by the ECFSPR statistician using all the raw data, in anonymised form, entered by the participating countries. Analysing the raw data allows comparison between different countries' data, something not possible using the individual countries' own annual reports. As a result of merging this data, analysis of some countries as presented in the ECSFPR report may differ from the data published in their national annual registry report. Differences can originate from patient inclusion criteria, different definitions used for disease complications and employment of different reference values. Further details on how this occurs and how this is dealt with can be found in the report and in the List of ECFSPR Variables and Definitions in Appendix 2 (page 122). Currently the ECFSPR is working with other international CF registries to harmonise the collection, presentation and interpretation of CF registry data worldwide. An example of this work is the standardisation of lung function prediction equations; it has been agreed that the Global Lung Function Initiative (GLI) equations should be used. In this report, for the first time, we present ECFSPR data on lung function based on the GLI equations. To allow comparison with previous annual reports, we also report lung function using the formerly used prediction equation, shown in Appendix 3 (page 126).

Over the past few years we have seen continuous growth of the ECFSPR. This report contains information from 26 countries with a total of 70 centres using the direct-data entry function of the ECFSPR software. We expect that the number of countries participating in the ECFSPR will continue to increase. Managing the ECFSPR comes with a cost and we are deeply indebted to our sponsors whose unrestricted grants have helped support the running and expansion of the Registry.

In addition to being the basis for this annual report, the ECFSPR data is used for research and other purposes to benefit people with CF, such as epidemiological research, assessing feasibility of clinical trials, and production of evidence needed by pharmaceutical companies in order to apply for approval of new treatments. Over the past five years, from 2011 to 2015, we have received 38 formal requests to use ECFSPR data. We are confident that the ECFSPR is evolving into a valuable resource for CF epidemiology

and health service research. We are currently finalising the development of a tool to benchmark centre and country results against meaningful standards, in collaboration with the ECFS Quality of Care Working Group. This benchmarking module will be integrated into ECFSTracker, and we expect to launch it in selected centres early in 2017.

The management of the ECFSPR and the development of this report take a considerable amount of work. I would like to take this opportunity to thank the national registries and individual centres, as well as the country representatives for their participation in the ECFSPR, especially in dealing with the huge demands of data collection and uploading for the 2011 to 2014 years. I would also like to thank the ECFSPR staff that have worked so hard on the production of this report and the running of the Registry. In particular, Jacqui van Rens, the ECFSPR Executive Coordinator, who ensures that everything, from data collection and handling of research requests to the arrangements for the bi-annual European meetings, runs like clock-work. I would like to thank the Service Desk, Alice Fox and Patrizia Iansa, for dealing with the many challenges associated with the increasing number of countries joining the ECFSPR. Alice and Patrizia have worked exceptionally hard in providing support on the ECFSTracker software to the participating countries with many different languages and multiple different hospital IT systems. Finally, many thanks to our statistician, Anna Zolin, for her careful and professional approach to the data analysis, an essential component of the Registry. Through the combined efforts of the ECFSPR staff and Executive Committee, in conjunction with the hard work of the members of the individual centres and countries that volunteer so much of their time, serial data from 2011 to 2014 has been uploaded to the ECFSPR in the past two years, a considerable accomplishment that has hugely improved the value of the Registry as an instrument for research and quality improvement. For this, we at the ECFSPR are extremely grateful.

Finally, I would like to thank all the people with CF throughout Europe for their willingness to participate in the ECFSPR. Without them, this Registry would not exist. We hope that the Registry's information is useful for people with CF, their families and caregivers and that it will lead to improved CF care throughout Europe.

Sincerely,

Edward F. McKone, MD, FRCPI
ECFSPR Director

To the people with cystic fibrosis

This report is about you and how cystic fibrosis (CF) affects you and other people all over Europe. The report is based on information collected by individual CF centres and the national CF registries that participate in the European Cystic Fibrosis Society Patient Registry (ECFSPR). We have tried to make the presentation of this data as clear as possible and hope that you will find the report interesting and easy to understand.

We will continue publishing key-information of the ECFSPR Report in a separate At-a-Glance report, with relevant information for the people with CF and their families. Over the coming year, we will work on a more sophisticated electronic version of this report, as well as additional tools to increase patient awareness of the Registry, such as posters with information about the Registry for distribution in CF-clinics and increasing our presence on social media.

If you have any suggestions on how we can improve the information or if something is unclear you are welcome to contact us. You can send an email to: ecfs-pr@uzleuven.be.

For discussions about the results in your country we encourage you to contact your CF centre.

More detailed information about the ECFSPR you will find on the patient-dedicated page of our website, www.ecfs.eu/projects/ecfs-patient-registry/information-about-ecfspr-cf-patients.

List of centres and national registries that provided the data

List of individual centres and national registries that contributed to the ECFSPR.

In Italics: new participants since the previous report with 2013 data;
In large print: the name of the country representative in the ECFSPR Steering Group;
Underlined: the name of the database manager for the national registry.

Country	Centre/National Registry name	Contact
Austria	12 individual centres:	Thomas Frischer Andreas Pfleger (from October 2016)
	Medizinische Universität Graz, Universitätsklinik für Kinder- und Jugendheilkunde, Klinische Abteilung für Pädiatrische Pulmonologie und Allergologie und CF Zentrum für Kinder, Jugendliche und Erwachsene, Graz	Ernst Eber Maria Wagenhofer
	Medizinische Universität Innsbruck, Departement für Kinder- und Jugendheilkunde, CF Zentrum für Kinder, Jugendliche und Erwachsene, Innsbruck	Helmut Ellemunter Johannes Eder
	Klinikum Klagenfurt am Wörthersee, Abteilung für Kinder- und Jugendheilkunde, Pädiatrische Pulmologie/Allergologie, Klagenfurt	Franz Hubert Wadlegger
	Kepler Universitätsklinikum, Kinder- und Jugendheilkunde, Abteilung Mucoviszidose, Linz	Maria Bauer
	Kardinal Schwarzenberg'sches Krankenhaus, Abteiling für Kinder- und Jugendmedizin, Schwarzach	Christoph Seelbach
	Landeskrankenhaus Steyr, Abteilung für Kinder- und Jugendheilkunde und Abteilung für Lungenheilkunde, Steyr	Josef Emhofer Alexander Ebner
	Allgemeines Krankenhaus Wien, Universitätsklinik für Chirurgie, Klinische Abteilung für Thoraxchirurgie, Vienna	Peter Jaksch Sabine Obermair Ramp
	Krankenhaus Hietzing, Abteilung für Atmungs- und Lungenerkrankungen, Vienna	*Ingrid Kaluza*
	Universitätsklinik für Kinder- und Jugendheilkunde, Cystische Fibrose Ambulanz, Vienna	Sabine Renner Brigitte Mersi
	Wilhelminenspital, Abteilung für Kinder- und Jugendheilkunde mit Ambulanz, Vienna	Thomas Frischer Kerstin Tiringer
	Klinikum Wels-Grieskirchen, Abteilung für Kinder- und Jugendheilkunde, Wels	Elisabeth Steiner Vera Bauer Beatrix Wintersteiger Nadine Raffler
	Klinikum Wels-Grieskirchen, Abteilung für Lungenkrankheiten, Wels	Helmut Feizelmeier
Belgium	Belgian Cystic Fibrosis Registry	Muriel Thomas Simeon Wanyama

Country	Centre/National Registry name	Contact
Czech Republic	Cystic Fibrosis Registry of the Czech Republic	Pavel Drevinek Milan Macek Alena Bilkova Marek Turnovec
Denmark	Cystic Fibrosis Registry of Denmark	Hanne Vebert Olesen Tania Pressler
France	Registre Français de la Mucoviscidose	Virginie Colomb Lydie Lemonnier
Greece	3 individual centres:	Elpis Hatziagorou
	Aghia Sophia Children's Hospital, CF Centre, Athens	*Athanasios Kaditis* *Ioanna Loukou* *Argyri Petrocheilou* *Fotini Tsiakalou*
	Sismanoglio General Hospital of Attica, Adult Cystic Fibrosis Unit, Athens	*Filia Diamantea* *Kostas Kotsifas*
	Aristotle University of Thessaloniki, Hippokration General Hospital, Cystic Fibrosis Centre, Thessaloniki	John Tsanakas Elpis Hatziagorou Maria Fotoulaki John Kioumis
Hungary	Cystic Fibrosis Registry of Hungary	Rita Ujhelyi Géza Marsal Attila Hornyák
Ireland	Cystic Fibrosis Registry of Ireland	Godfrey Fletcher Abaigeal Jackson Shijun Zhou
Israel	Cystic Fibrosis Registry of Israel	Meir Mei-Zahav
Italy	Cystic Fibrosis Registry of Italy	Rita Padoan Gianluca Ferrari Patrizia Iansa Marco Salvatore
Latvia	1 individual centre:	Karina Mahlina
	Rīga Stradinš University, Children's Clinical University Hospital, Department of Pneumology, Riga	Vija Švabe Karina Mahlina
Lithuania	1 individual centre:	Kęstutis Malakauskas
	Hospital of Lithuanian University of Health Sciences, Kaunas Clinics, Adult Cystic Fibrosis Centre, Kaunas	Kęstutis Malakauskas
Republic of Macedonia	1 individual centre:	Stojka Fustik
	University Children's Hospital, Centre for Cystic Fibrosis, Skopje	Stojka Fustik
Republic of Moldova	Cystic Fibrosis Registry of Moldova	Svetlana Sciucca
Netherlands	Dutch Cystic Fibrosis Registry	Vincent Gulmans

Country	Centre/National Registry name	Contact
Portugal	Cystic Fibrosis Registry of Portugal	Luísa Pereira
Romania	1 individual centre:	Simona Mosescu
	Clinical Children's Hospital, Grigore Alexandrescu, Bukarest, Romania	Simona Mosescu
Russian Federation	Cystic Fibrosis Registry of the Russian Federation	Nataliya Kashirskaya Alexander Chernyak Elena Amelina Stanislav Krasovskiy Elena Kondrtyeva Anna Voronkova
Serbia	1 individual centre:	Milan Rodic
	National Centre for Cystic Fibrosis, Mother and Child Health Institute of Serbia "Dr Vukan Cupic", Belgrade	Milan Rodic
Slovakia	Cystic Fibrosis Registry of Slovakia	Hana Kayserova Mariá Drugdova
Slovenia	2 individual centres:	Uroš Krivec
	University Clinic of Pulmonary and Allergic Diseases, Golnik	Matjaž Fležar Andraz Jakelj
	University Children`s Hospital, Pulmonary Department, Ljubljana	Uroš Krivec Ana Kotnik Pirs
Spain	15 individual centres:	Carlos Vazquez-Cordero
	Hospital de Sabadell, Corporació Sanitària Parc Taulí, Clinica Pediátrica, Unitat Clinica de Fibrosis Quística, Barcelona	Xavier Domingo Miró
	Hospital Sant Joan de Déu, Unitat de Pneumologia Pediátrica i Fibrosi Quística, Barcelona	Jordi Costa i Colomer
	Hospital Vall d'Hebron, Unidad Fibrosis Quística e Neumologia Pediátrica, Barcelona	Silvia Gartner
	Hospital Universitario La Princesa, Neumologia Adultos, Madrid	Rosa María Girón
	Hospital Niño Jesús, Sección de Neumologia Pediátrica/Unidad de Fibrosis Quística, Madrid	Jose R. Villa Asensi
	Hospital Universitario de Ramón y Cajal, Unidad de Fibrosis Quística, Madrid	Adelaida Lamas Ferreiro
	Hospital 12 de Octubre, Unidad de Fibrosis Quística, Madrid	Gloria Garcia Hernandez
	Hospital Regionale Universitario de Málaga, Unidad Fibrosis Quística Adultos, Málaga	Casilda Olveira Fuster Gabriel Maria Olveira Fuster Nuria Porras Pèrez
	Hospital Regional Universitario de Málaga, Unidad de Fibrosis Quística Pediátrica, Málaga	Francisco Javier Perez-Frias Estela Perez-Ruiz Pilar Caro-Aguilera
	Hospital Universitario Virgen de la Arrixaca, Unidad de Fibrosis Quística, Murcia	Pedro Mondéjar-López

Country	Centre/National Registry name	Contact
	Hospital Universitario Virgen del Rocío, Unidad de Fibrosis Quística, Sevilla	Isabel Delgado Pecellín Esther Quintana Gallego
	Hospital Clinico Universitario de Valencia, Unidad de Fibrosis Quística Pediátrica, Valencia	Amparo Escribano Montaner Silvia Castillo
	Hospital Universitario La Fe, Unidad de Trasplante Pulmonar y Fibrosis Quística, Valencia	Amparo Solé Jover Carmen Inés Perez Munoz
	Hospital Universitario de Cruces, Unidad de Fibrosis Quística, Bizkaya	Carlos Vazquez Cordero
	Hospital Universitario Miguel Servet, Unidad de Neumología Pediátrica y Fibrosis Quística, Zaragoza	Carlos Martín de Vicente
Sweden	Cystic Fibrosis Registry of Sweden	Isabelle de Monestrol Anders Lindblad
Switzerland	14 individual centres:	Andreas Jung
	Kantonsspital Aarau AG, Klinik für Kinder und Jugendliche, Abteilung pädiatrische Pneumologie, Allergologie und Immunologie, Klinik für Pneumologie und Schlafmedizin, Aarau	Dominik Müller-Suter Sarosh Irani
	Lindenhofspital Bern, Praxis für Pneumologie "Quartier Bleu", Bern	Reta Fischer Carlo Mordasini
	Universitätsklinik für Kinderheilkunde, Zentrum für Cystische Fibrose und Pulmonologie, Inselspital, Bern	Carmen Casaulta Philipp Latzin
	Hôpital Cantonal Fribourg, Pädiatrie, Fribourg	Denise Herzog Johannes Wildhaber
	Hôpitaux Universitaires de Genève, Département de l'enfant et de l'adolescent, Unité de Pneumologie Pédiatrique, Genève	Constance Barrazzone Anne Mornand
	Hôpitaux Universitaires de Genève, Département des Spécialités de Medicine, Service de Pneumologie, Consultation de Muco-viscidose Adulte, Genève	*Paola Gasche* *Jérôme Plojoux*
	Centre Hospitalier Universitaire Vaudois (CHUV), Départment Médico-Chirurgical de Pédiatrie, Pneumologie Pédiatrique et Mucoviscidose, Lausanne	Gaudenz Hafen Macha Rochat
	Centre Hospitalier Universitaire Vaudois (CHUV), Policlinique Médicale Universitaire, Départment de Médecine, Consultation Adulte de Mucoviscidose, Lausanne	Laurent Nicod Marie Hofer
	Luzerner Kantonsspital, Zentrum für Zystische Fibrose für Kinder und Erwachsene, Abteilungen für Pneumologie, pädiatrische Pneumologie und pädiatrische Gastroenterologie, Luzern	Bernhard Schwizer Nicolas Regamey Johannes Spalinger
	Hôpital de Morges, Consultation de Mucoviscidose Adulte, Morges	Alain Sauty Marie Hofer
	Ostschweizer Kinderspital, Pädiatrische Pneumologie und CF-Zentrum, St. Gallen	Jürg Barben

Country	Centre/National Registry name	Contact
	Kantonspital St Gallen, Klinik für Pneumologie und Schlafmedizin, Spezialsprechstunde für Adulte Cystische Fibrose, St. Gallen	Martin Brutsche Rebekka Kleiner
	Universitäts-Kinderspital Zürich, Abteilung für Pneumologie, Zürich	Andreas Jung Romy Rodriguez Alexander Möller
	Universitätsspital Zürich, Klinik für Pneumologie, Adultes CF Zentrum, Zürich	Christian Benden Thomas Kurowski
Ukraine	1 individual centre:	Halyna Makukh
	SI "Institute of Hereditary Pathology of Ukranian National Medical Academy", Lviv	Halyna Makukh Lyudmyla Bober
United Kingdom	UK Cystic Fibrosis Registry	Rebecca Cosgriff Elaine Gunn Siobhán Carr

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For this report, the tables and graphs were written, commented and/or revised by:

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Alice Fox and **Patrizia Iansa**, Italy, ECFSPR Service Desk;
Ulrike Pypops, Belgium: CF Europe representative in the ECFSPR;
Vincent Gulmans, The Netherlands, **Andreas Jung**, Switzerland, **Rebecca Cosgriff**, United Kingdom: members of the ECFSPR Executive Committee;
Contributing country managers and national representatives (the names are listed on page 6);
Edward McKone, Ireland, ECFSPR Director.

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Introduction

The European Cystic Fibrosis Society Patient Registry (ECFSPR)

The ECFSPR collects demographic and clinical data of consenting cystic fibrosis (CF) patients from Europe and neighbouring countries. Data is collected using a common set of variables and definitions, and is sent to the ECFSPR in one of the following ways:

- National CF registries (or individual centres with local databases) extract patient data from their own database and import the data into the ECFSPR software;
- Individual centres enter patient data directly into the ECFSPR software.

Collection of data at a local level must be approved by local data protection authorities in accordance with European data protection legislation. Data stored in the central database is anonymous, and only year/month of birth and randomised centre numbers are used as identifiers. Data is available for scientific purposes on application. All requests are reviewed by the ECFSPR Scientific Committee and, based on their recommendation, the country representatives in the Steering Group (composed of national representatives of the countries that contribute data to the ECFSPR) decide if the data request is approved or not; this decision is final. Requests originating from the Industry are also reviewed by the ECFS Clinical Trials Network. All applications must meet the European and individual country data protection legislation regarding patient anonymity.

For more information, please visit our website www.ecfs.eu/projects/ecfs-patient-registry/intro.

General Considerations

For the national registries, it is possible that some of their definitions and data coding do not fully correspond to those employed by the ECFSPR, either because some types of information are not collected, or are collected by the national registry using a different method. When the national registries upload their data they are also asked to state in a document whether their variables definitions meet those of the ECFSPR. Where major discrepancies between the definitions are present, those variables have been omitted from the annual report, and in the case of minor discrepancies a footnote has been added to the graphs and tables. For example, the ECFSPR collects information on the presence of chronic *Pseudomonas aeruginosa* infection according to the modified Leeds criteria and/or the presence of elevated *Pseudomonas* antibodies (see Appendix 2 on page 122). If a national registry collects such information as "at least one positive *Pseudomonas aeruginosa* culture this year", this information would be too different from the ECFSPR definition of chronic *Pseudomonas aeruginosa*, and we would set this variable to "missing" for that particular country. If, instead, a country defines chronic *Pseudomonas aeruginosa* as "the presence of more than four positive cultures in 6 months", the data of this variable would be included in the annual report since the definition is much closer to the ECFSPR definition. Where this is the case, a footnote has been added to the relevant tables and graphs.

If a country does not collect a certain variable (or if it is completely different from the ECFSPR definitions as described above), we have omitted that country from the relevant graphs in the report. The same applies for countries where the information for a variable is missing for more than 10% of the patients. All

data, however, is presented in the tables. The number of missing values is important for the interpretation of the results, since it is impossible to know if a patient with a missing value for a given complication has this complication or not, which makes the given frequencies less accurate. For example, in a country where 7% of the patients have liver disease but 20% of patients have unknown/missing information on liver disease, the true frequency of liver disease can be anything between 7 and 27%.

You will find some differences between the findings of the national registries' own reports and the ECFSPR report. This is because some variable values are recoded or computed in different ways. For example, some national registries compute the age at the annual visit and consider 16 years as the cut-off for adult age. The ECFSPR computes the age at FEV_1/height/weight measurement and the age at follow-up (the end of the year) and considers 18 years as the cut-off for adult age. Since clinical outcomes do not change very much over a 12 month period, we do not consider this to be a serious obstacle to interpretation. Another example: for lung function values such as FEV_1 the raw data values, reported in litres, are not informative unless they are expressed in relation to the age, sex and height of the patient. We therefore needed to transform the raw values into new variables in order to compare lung function between patients and countries. We used common reference populations for all data when calculating the values as a percentage of predicted from the raw data. Slightly different values can be obtained when using another reference population on the same raw data. It is important to use a common method of calculation when comparing different countries, just as the national registries choose a common method of calculation when they compare the individual centres in that country.

Glossary and Abbreviations

Country codes:

AT:	Austria	LV:	Latvia
BE:	Belgium	MD:	Republic of Moldova
CH:	Switzerland	MK:	Republic of Macedonia
CZ:	Czech Republic	NL:	The Netherlands
DK:	Denmark	PT:	Portugal
ES:	Spain	RO:	Romania
FR:	France	RS:	Serbia
GR:	Greece	RU:	Russian Federation
HU:	Hungary	SE:	Sweden
IE:	Ireland	SI:	Slovenia
IL:	Israel	SK:	Slovak Republic
IT:	Italy	UA:	Ukraine
LT:	Lithuania	UK:	United Kingdom

Explanation of terms:

ABPA: allergic bronchopulmonary aspergillosis, an allergic reaction to the mould *Aspergillus.*
BMI: body mass index (weight (kg)/(height (m)^2).
Bronchodilator: medication that relaxes the muscles of the airways, used also for asthma.
CFRD: CF-related diabetes.
CFTR: CF transmembrane conductance regulator, is a protein at the cell surface that controls the salt and water balance across a cell. The gene that causes CF is the blueprint for the CFTR protein. Everyone has two copies of the gene for CFTR, but to be born with CF, both CFTR genes must be affected by a CF-causing mutation.
FEV_1: forced expiratory volume in one second (lung function parameter).
FEV_1%: the FEV_1 as a percentage of the average value for healthy people of the same age, height and sex.
Haemoptysis: coughing up blood. This happens frequently in small amounts in CF, so the complication we asked for here is major bleeding (more than 250 ml).
Homozygous: CF is caused by mutations of the CFTR gene, one on each allele. One is inherited from the mother and one from the father. If both mutations are the same, the person is said to be homozygous for this mutation.
Heterozygous: CF is caused by mutations of the CFTR gene, one on each allele. One is inherited from the mother and one from the father. If these are two different mutations, the person is considered to be heterozygous.
Max: maximum. It is the highest value.
Mean: it is the average value of a set of measurements. For example, if the mean age at diagnosis is 3 years, it means that, on average, the patients are diagnosed when they are 3 years old.
Meconium ileus: congenital obstruction of the gut with thick, sticky faeces.
Median: the value that separates the set of measurements in two halves, so that 50% of measurements are below the median value and the other 50% of measurements are above the median value. For example, if median age at diagnosis is 5 months, it means that half of the patients are diagnosed before 5 months of age, and the other half of the patients are diagnosed after 5 months of age.
Min: minimum. It is the lowest value.
N: the number of patients in a group for whom the information is not missing.
N miss: number of missing values. It is the number of patients for whom the information was missing.
NaCl: sodium chloride. Here: inhaled hypertonic saline.
Pancreatic insufficiency: the absence of pancreatic enzymes in the gut leading to malnutrition if not treated (pancreatic insufficiency is therefore defined as the use of pancreatic enzyme supplementation).
25th Pctl: 25th percentile, also called first quartile. It is the value that separates the set of measurements in two parts, so that one quarter (25%) of the measurements is below it and the other three quarters are above it. For example, if the 25th percentile for age at diagnosis is 1 month, it means that a quarter of the patients are diagnosed before 1 month of age, and the other three quarters are diagnosed after 1 month of age.
75th Pctl: 75th percentile, also called third quartile. It is the value that separates the set of measurements in two parts, so that three quarters (75%) are below it and the other quarter is above it. For example, if the 75th percentile for age at diagnosis is 3 years, it means that three quarters of the patients are diagnosed before 3 years, the other quarter are diagnosed after 3 years.
Pneumothorax: collapsed lung, in CF usually because of severe lung damage.
Quartiles: The 25th Percentile, the median (the 50th Percentile) and the 75th percentile are collectively called quartiles, because they divide the set of measurements into quarters.
rhDNase: ribosomal human DNase – marketed as Pulmozyme®.
Z-score: it indicates how far a value is from the mean value of a reference population (see Appendix 1 for details). Negative z-scores mean that the value is below the mean of values in the reference population, whereas positive z-scores mean that the value is above the mean. For example, a z-score for weight of -2 means that the weight is 2 standard deviations below the mean of subjects of the same age and sex of the reference population. For example, if the z-score for BMI of a 10 years old boy is -2, it means that the BMI for that boy is 2 standard deviations below the mean BMI of 10 years old boys of the reference population.

Summary of data report

Outcome		Females	Males	Total
Patients registered in the ECFSPR	n	16856	18726	35582*
	(%)	(47.37)	(52.63)	
Age at follow-up (in years, patients alive on 31/12/2014)	mean	20.0	20.9	20.5
	median	18.0	19.3	18.6
Patients ≥ 18 years (patients alive on 31/12/2014)	%	50.1	53.3	51.8
Age at diagnosis**	mean (years)	4.1	4.0	4.1
	median (months)	3.6	3.6	3.6
Patients with at least one F508del allele**	%	81.7	81.5	81.6
Patients living with lung transplant**	n	841	860	1701
	(%)	(5.5)	(5.1)	(5.3)
Patients living with liver transplant**	n	60	109	169
	(%)	(0.4)	(0.6)	(0.5)
Patients deceased in 2014***	n	203	183	386
	(%)	(1.3)	(1.0)	(1.1)
Age at death***	mean (years)	27.8	29.6	28.7
	median (years)	25.0	29.0	27.0

* For demographic purposes Belgian 2013 data (N=1,186) has been included in this total.

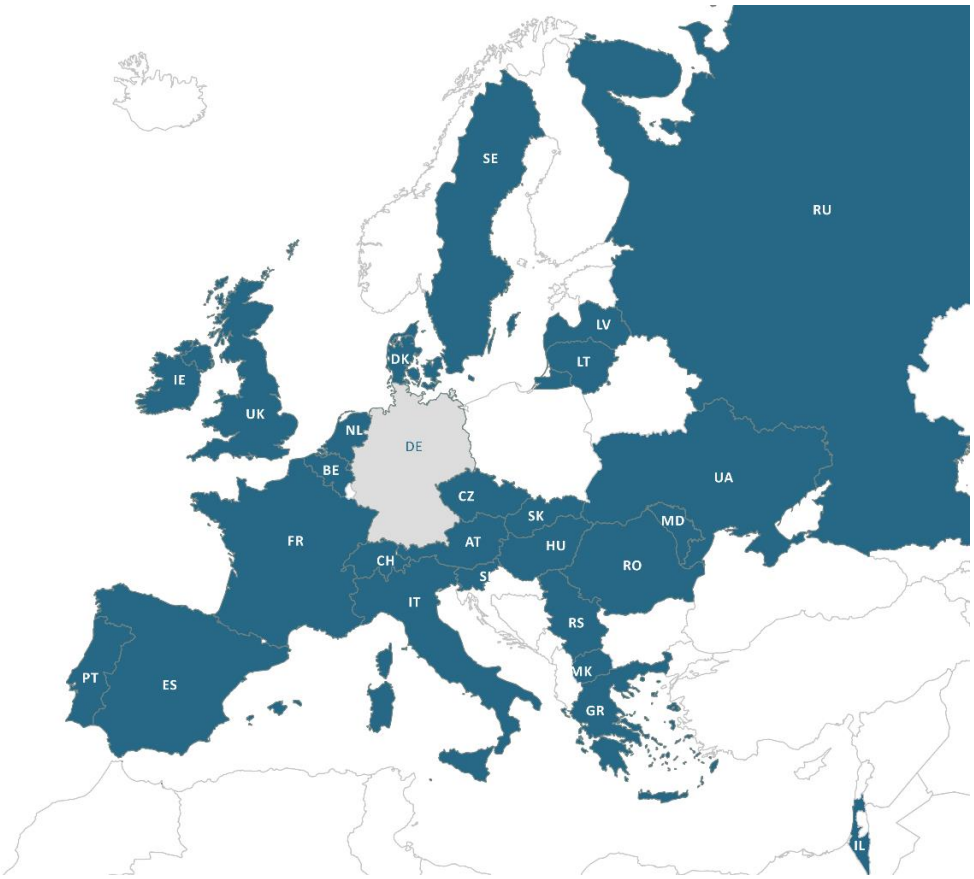
** Only patients seen during the year are presented. Belgian 2013 data (N=1,153) is not included. The total number of patients presented is 32,514.

** Only patients seen during the year are presented. Belgian 2013 data (N=1,153) is not included. For the United Kingdom, all seen patients with confirmed diagnosis of CF are included (N=10,580). The total number of patients presented is 33,664.

Data report

1. Demographics

Figure 1.1 Map of countries that contributed to the ECFSPR in 2014.



Countries that contributed 2014 data are in blue.
Germany, who will send these data at the end of 2016, is in grey.

Table 1.1 Number of patients in 2014, by country.

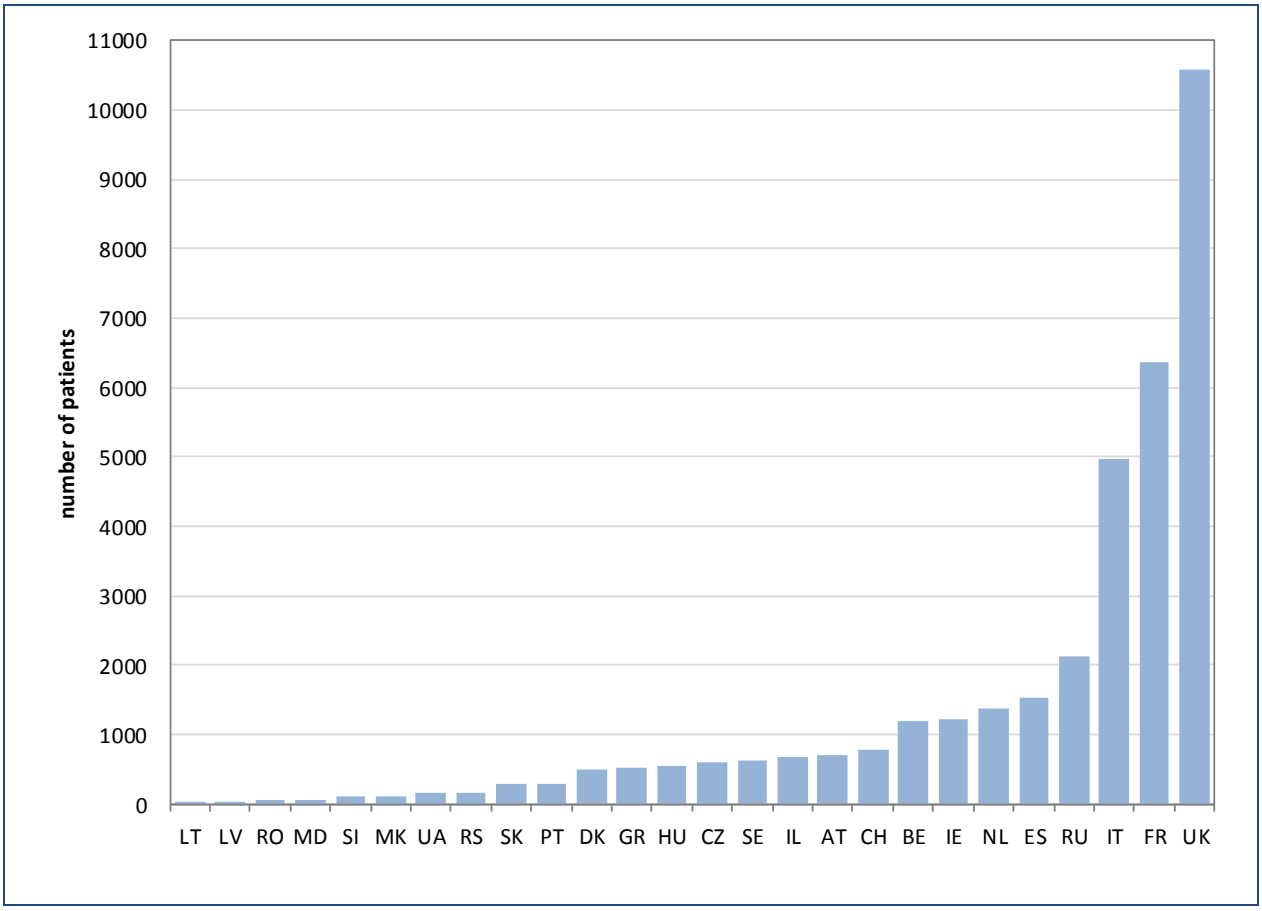
Country	Patients registered, not lost to follow-up	Patients seen	Estimated coverage 2014
Austria	712	687	90%
Belgium*	1186	1153	>90%[1]
Czech Republic*	599	599	>95%
Denmark*	488	459	>95%
France*	6369	6369	90%
Greece**	517	507	90%
Hungary*	557	557	>90%
Ireland*	1218	942	>90%
Israel**	666	547	95%
Italy*	4981	4980	>90%
Latvia	38	38	>90%
Lithuania	12	12	20%[2]
Rep of Macedonia	109	100	>90%
Rep of Moldova*	61	61	68-76%
The Netherlands*	1378	1378	98%
Portugal**	295	258	85%
Romania	44	40	10%[3]
Russian Federation*	2122	2121	63%
Serbia	169	154	>90%
Slovak Republic**	290	241	>90%
Slovenia	97	84	>95%
Spain	1538	1481	50%
Sweden*	626	626	>90%
Switzerland	782	736	>80%
Ukraine	147	107	15-18%
United Kingdom*	10581	9430	99%[4]
Total	35582	33667	

* Countries with an established national CF registry.
** These countries have a national registry, but use the direct data-entry function of ECFSTracker.
[1] Data are from 2013 and presented for demographic purposes. The 2014 data could not be delivered in time due to the introduction of a new data-collection and validation software.
[2] Coverage is 100% for adults and 0% for children.
[3] Coverage is 0% for adults and 100% for children.
[4] The total number for UK is two patients less than the 2014 UK annual report due to the removal of CF diagnosis.

The column “Patients registered, not lost to follow-up” shows the patients that attend centres, and includes patients that have not been seen during the year but are known to be alive that year.
The column “patients seen” presents the patients who have a recorded clinic attendance during the year.
The column “Estimated coverage 2014” shows the estimated percentage of CF patients living in that country who are included in the national registries/national data collections as reported by the country. For some countries one individual centre may include almost all patients, e.g. Latvia and Serbia.

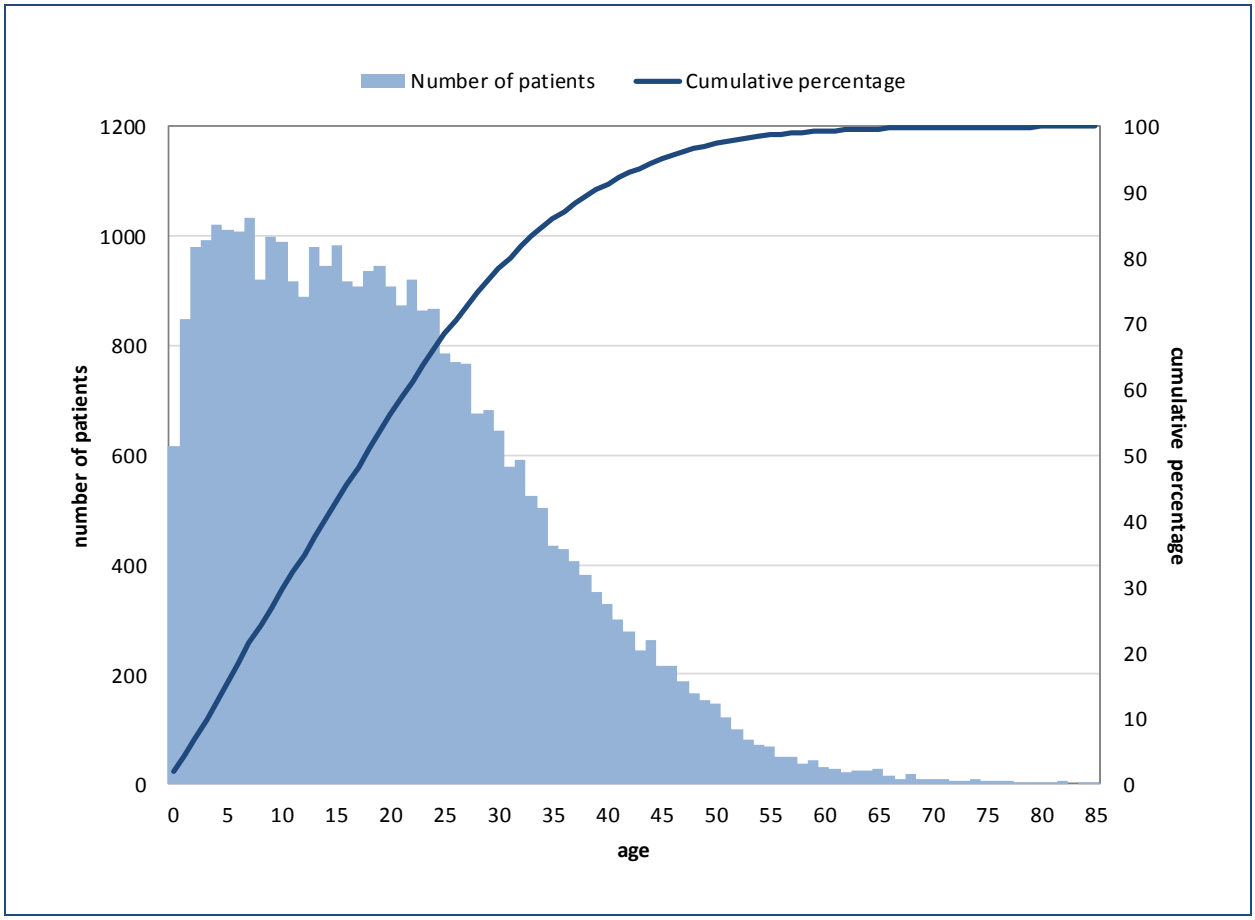
In all subsequent tables and graphs, the data referred to is for 2014, except for Belgium, for which 2013 data was used. The Belgian 2013 data is shown for demographic purposes and presented only in the demographic section.

Figure 1.2 Number of patients registered in the ECFSPR in 2014, by country.



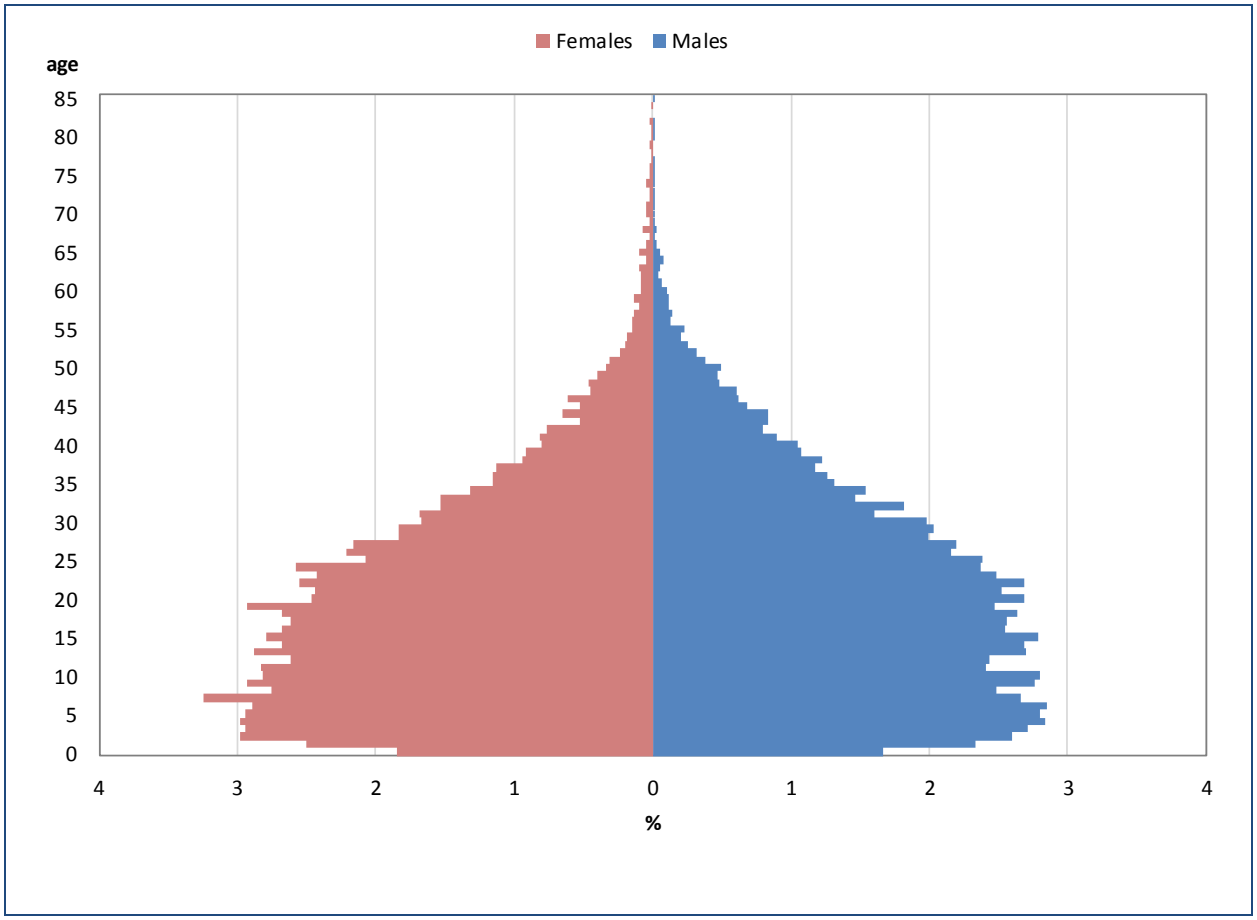
Each vertical bar shows the number of registered patients living in that country in 2014. Please refer to table 1.1 for the coverage in each country.

Figure 1.3 Age at follow-up distribution. Patients registered alive on 31/12/2014.



Each blue vertical bar represents the number of patients of that age alive in 2014. The cumulative percentage (the dark blue line) describes how many patients (as a percentage) are below a certain age (e.g. 50% of the patients are younger than 18.6 years old).

Figure 1.4 Age at follow-up distribution by sex. Patients registered, alive on 31/12/2014.



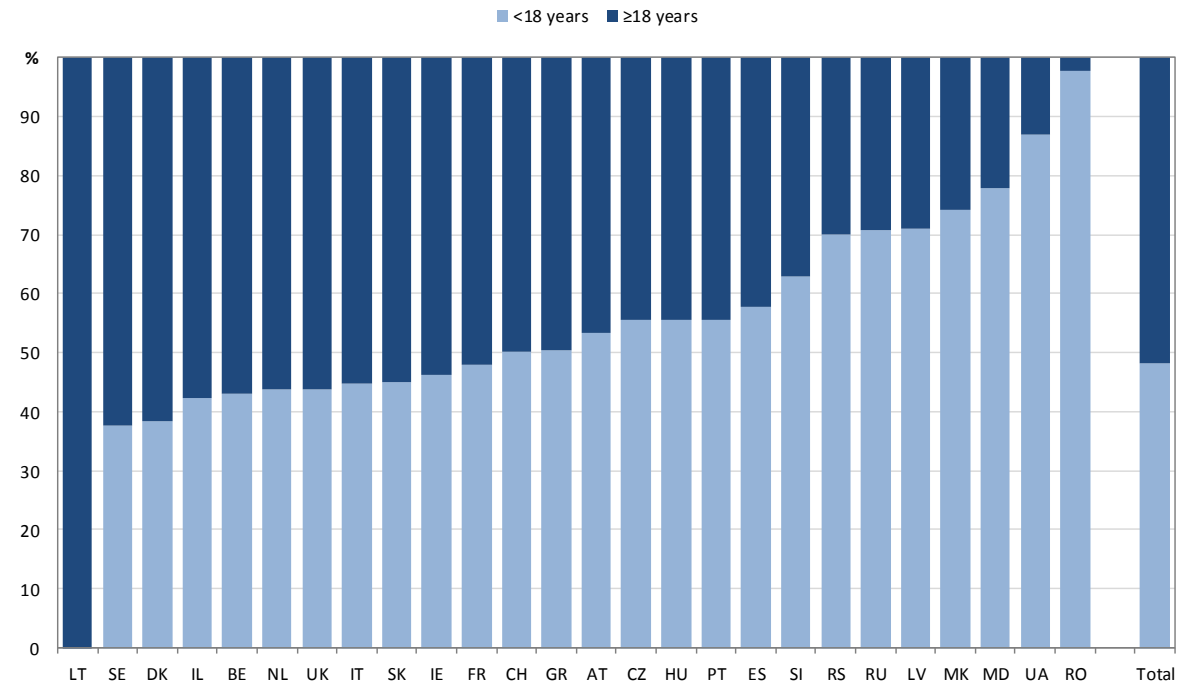
The pyramid shows the percentage of patients of different ages as horizontal bars. The blue side of the pyramid shows, for males, how many patients (as a percentage) are a certain age, the red side shows the same for females. The lower percentage of patients at the bottom of the pyramid is due to the fact that some patients have not yet been diagnosed (mean age at diagnosis is 4.08 years, see table 2.1).

Table 1.2 Proportion of adults (≥18 years) and children (<18 years), by country. Patients registered, alive on 31/12/2014.

Country	Children (<18 years) number (%)	Adults (≥18 years) number (%)
Austria	376 (53.26)	330 (46.74)
Belgium	508 (43.01)	673 (56.99)
Czech Republic	327 (55.52)	262 (44.48)
Denmark	186 (38.51)	297 (61.49)
France	3018 (47.91)	3281 (52.09)
Greece	259 (50.39)	255 (49.61)
Hungary	304 (55.58)	243 (44.42)
Ireland	554 (46.24)	644 (53.76)
Israel	279 (42.21)	382 (57.79)
Italy	2211 (44.84)	2720 (55.16)
Latvia	27 (71.05)	11 (28.95)
Lithuania	0 (0)	12 (100)
Rep of Macedonia	81 (74.31)	28 (25.69)
Rep of Moldova	46 (77.97)	13 (22.03)
The Netherlands	597 (43.70)	769 (56.30)
Portugal	164 (55.59)	131 (44.41)
Romania	42 (97.67)	1 (2.33)
Russian Federation	1472 (70.67)	611 (29.33)
Serbia	117 (70.06)	50 (29.94)
Slovak Republic	130 (45.14)	158 (54.86)
Slovenia	61 (62.89)	36 (37.11)
Spain	882 (57.80)	644 (42.20)
Sweden	234 (37.68)	387 (62.32)
Switzerland	392 (50.26)	388 (49.74)
Ukraine	127 (86.99)	19 (13.01)
United Kingdom	4572 (43.74)	5880 (56.26)
Total	16966 (48.21)	18225 (51.79)

Belgium: 2013 data.
Lithuania: coverage is 100% for adults and 0% for children.
Romania: coverage is 0% for adults and 100% for children.

Figure 1.5 Proportion of adults (≥18 years) and children (<18 years). Patients registered, alive on 31/12/2014.



Note: Belgium: 2013 data.
Lithuania: coverage is 100% for adults and 0% for children.
Romania: coverage is 0% for adults and 100% for children.

This graph shows the percentage of patients in each country who are adults (dark blue) or children (light blue). The percentage of adult patients varies considerably between the different countries. One of the reasons is the way the patients are included: for some countries only a few individual centres sent data to the ECFSPR, and the proportion of children and adults may reflect the proportion of paediatric and adult centres in that country that participate in the ECFSPR. Please refer to table 1.1 for national coverage.

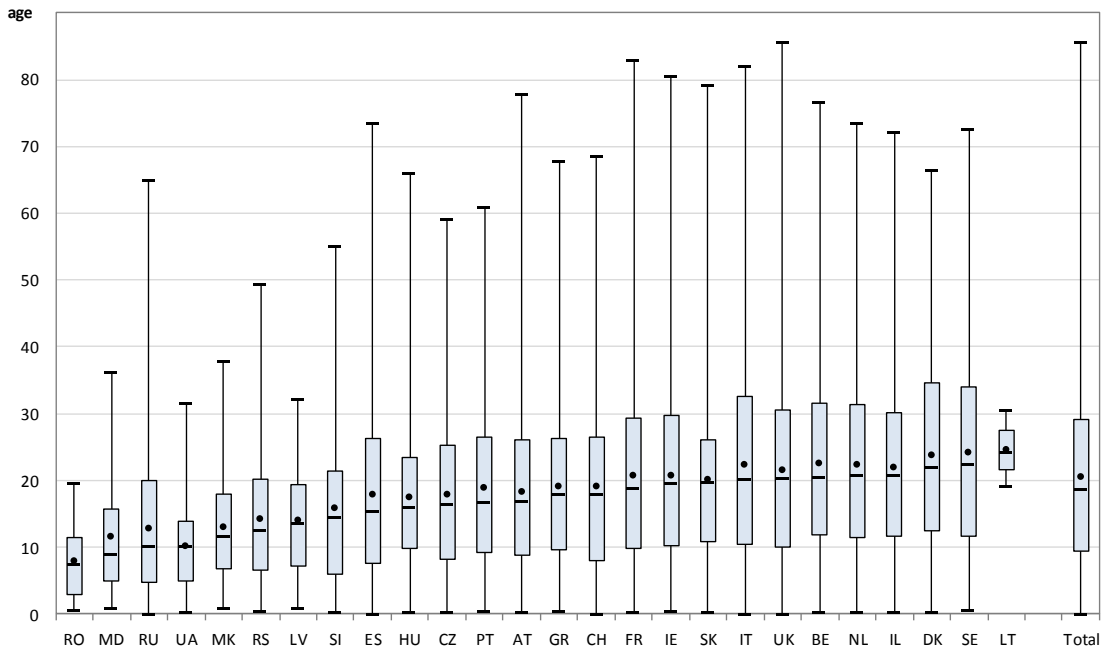
Table 1.3 Age at follow-up: descriptive statistics, by country and overall. Patients registered, alive on 31/12/2014.

Country	N	Mean (average age)	Min (age of the youngest patient)	25th pctl (25% of the patients are younger than this age)	Median (half the patients are younger than this age)	75th pctl (75% of the patients are younger than this age)
Austria	706	18.2	0.2	8.9	16.9	26.0
Belgium	1181	22.6	0.2	11.9	20.5	31.5
Czech Republic	589	17.8	0.2	8.3	16.5	25.2
Denmark	483	23.7	0.1	12.5	22.0	34.6
France	6299	20.7	0.1	9.8	18.9	29.3
Greece	514	19.1	0.4	9.6	17.8	26.2
Hungary	547	17.4	0.2	9.8	16.1	23.4
Ireland	1198	20.7	0.4	10.3	19.5	29.7
Israel	661	22.0	0.1	11.7	20.8	30.2
Italy	4931	22.3	0.0	10.5	20.1	32.6
Latvia	38	13.9	0.8	7.1	13.6	19.4
Lithuania	12	24.6	19.1	21.7	24.2	27.6
Rep of Macedonia	109	13.0	0.9	6.7	11.6	18.0
Rep of Moldova	59	11.6	0.9	4.9	9.0	15.8
The Netherlands	1366	22.4	0.1	11.5	20.7	31.3
Portugal	295	18.9	0.3	9.3	16.6	26.5
Romania	43	8.0	0.5	3.0	7.5	11.5
Russian Federation	2083	12.8	0.0	4.7	10.2	19.9
Serbia	167	14.2	0.3	6.5	12.5	20.1
Slovak Republic	288	20.0	0.2	10.8	19.7	26.0
Slovenia	97	15.9	0.1	5.9	14.4	21.4
Spain	1526	17.9	0.0	7.6	15.5	26.3
Sweden	621	24.1	0.5	11.7	22.4	34.0
Switzerland	780	19.1	0.0	8.0	17.9	26.4
Ukraine	146	10.2	0.2	4.9	10.2	14.0
United Kingdom	10452	21.6	0.0	10.0	20.2	30.5
Total	35191	20.5	0.0	9.4	18.6	29.2

Note: Belgium: 2013 data.
Lithuania: coverage is 100% for adults and 0% for children.
Romania: coverage is 0% for adults and 100% for children.

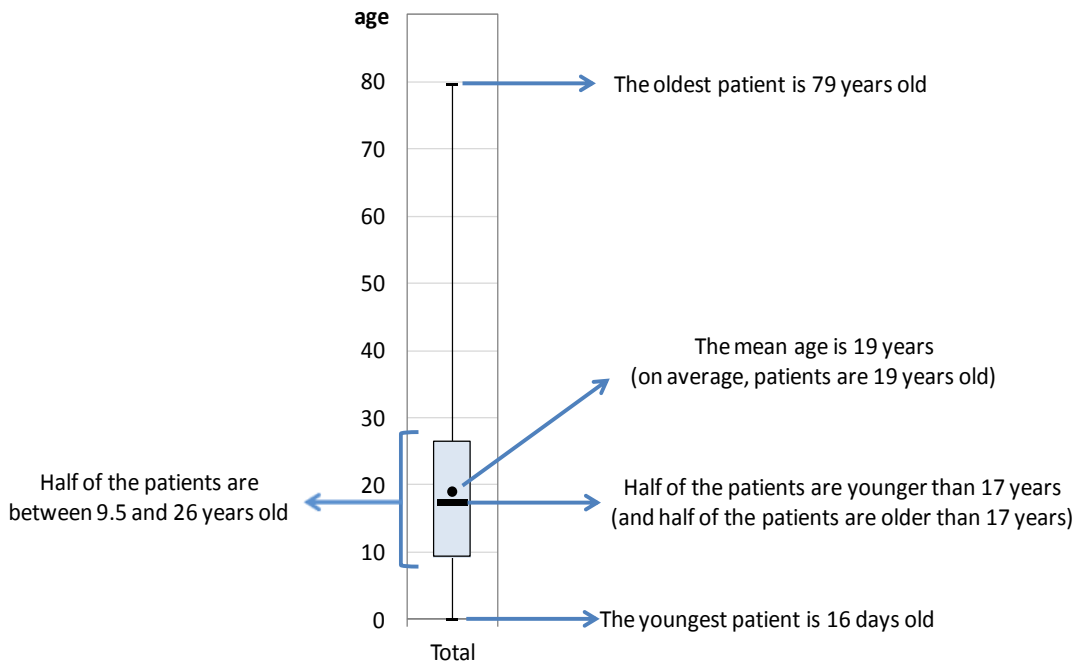
This table shows the descriptive statistics for age at follow-up of the patients by country and overall. Only registered patients who were alive on December 31st 2014 are included.

Figure 1.6 Age at follow-up: box-plot, by country and overall. Patients registered, alive on 31/12/2014.



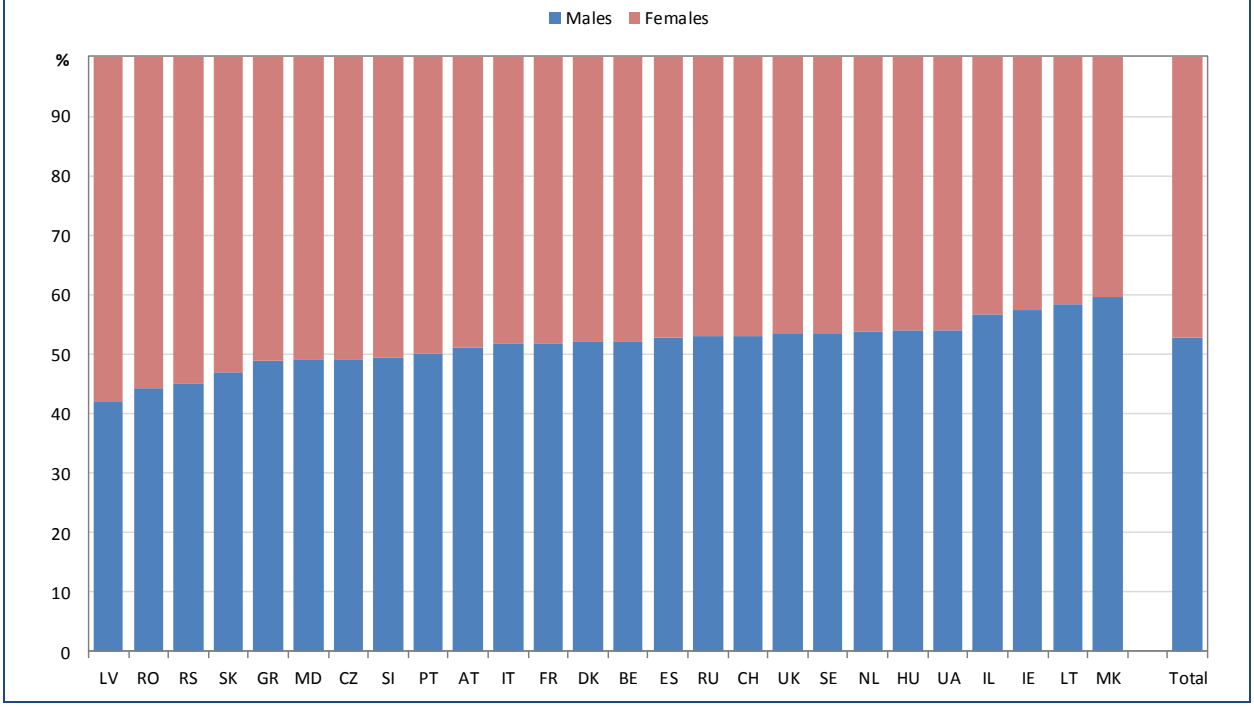
Note: Belgium: 2013 data.
Lithuania: coverage is 100% for adults and 0% for children.
Romania: coverage is 0% for adults and 100% for children.

This box-plot is a graphic representation of the age detailed in table 1.3. For each country the dash (black line crossing the blue box) is the median, the black dot is the mean and the whiskers (vertical lines with a T-shaped end) are the minimum and the maximum. The following figure explains how to read the box.



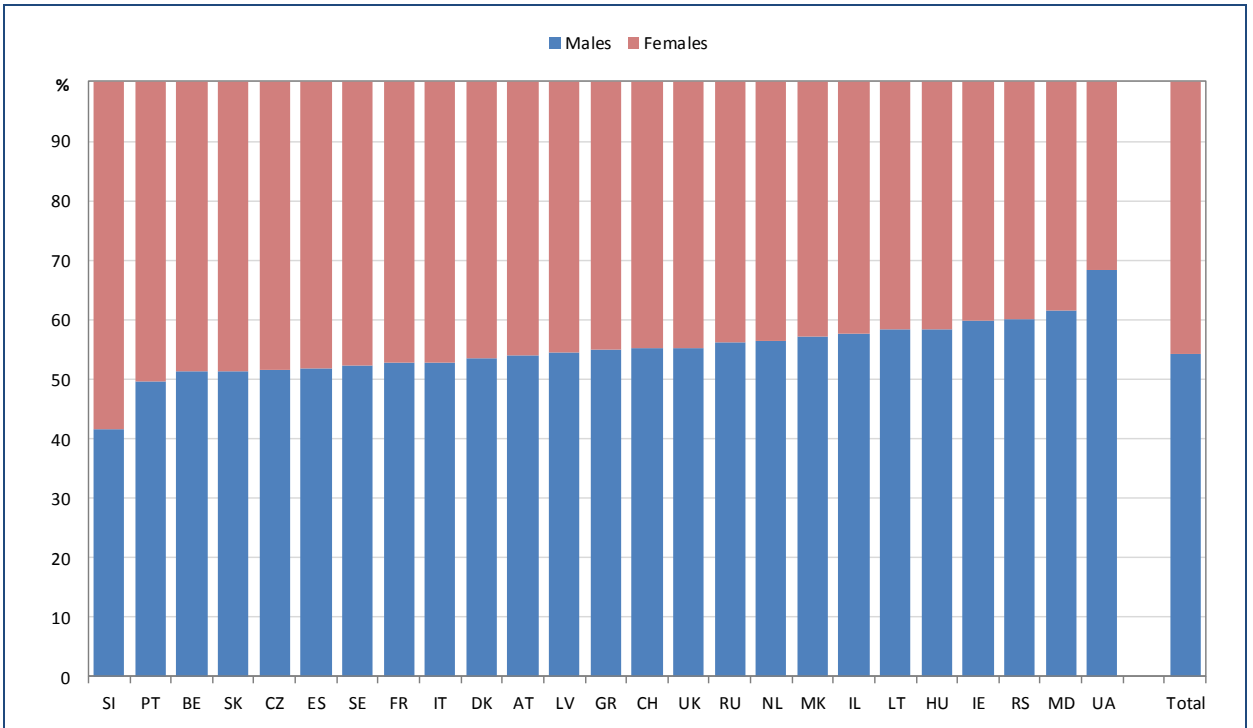
Note: This is an example of how to read a boxplot. The numbers used in this figure are not real and do not refer to figure 1.6.

Figure 1.7 Sex distribution, by country and overall. Patients registered, alive on 31/12/2014.



Sex distribution of all patients. Overall (see "Total"), in the ECFSPR there are more male than female patients, which could reflect higher mortality in female CF patients. The proportion is not uniform across the different countries.

Figure 1.8 Sex distribution, by country and overall. Patients registered alive on 31/12/2014 and aged 18 years or more.



Note: Romania has only one adult patient and is excluded from the graph.

Sex distribution for adult patients. The total proportion of females in the adult group is similar to the proportion of females in the whole population.

2. Diagnosis

From here onwards, only patients seen during the year are presented and Belgian 2013 data (N=1,153) is not included. The information on diagnosis and on all the other sections for people with CF registered in Belgium are reported in the ECFSPR Annual Report 2013.

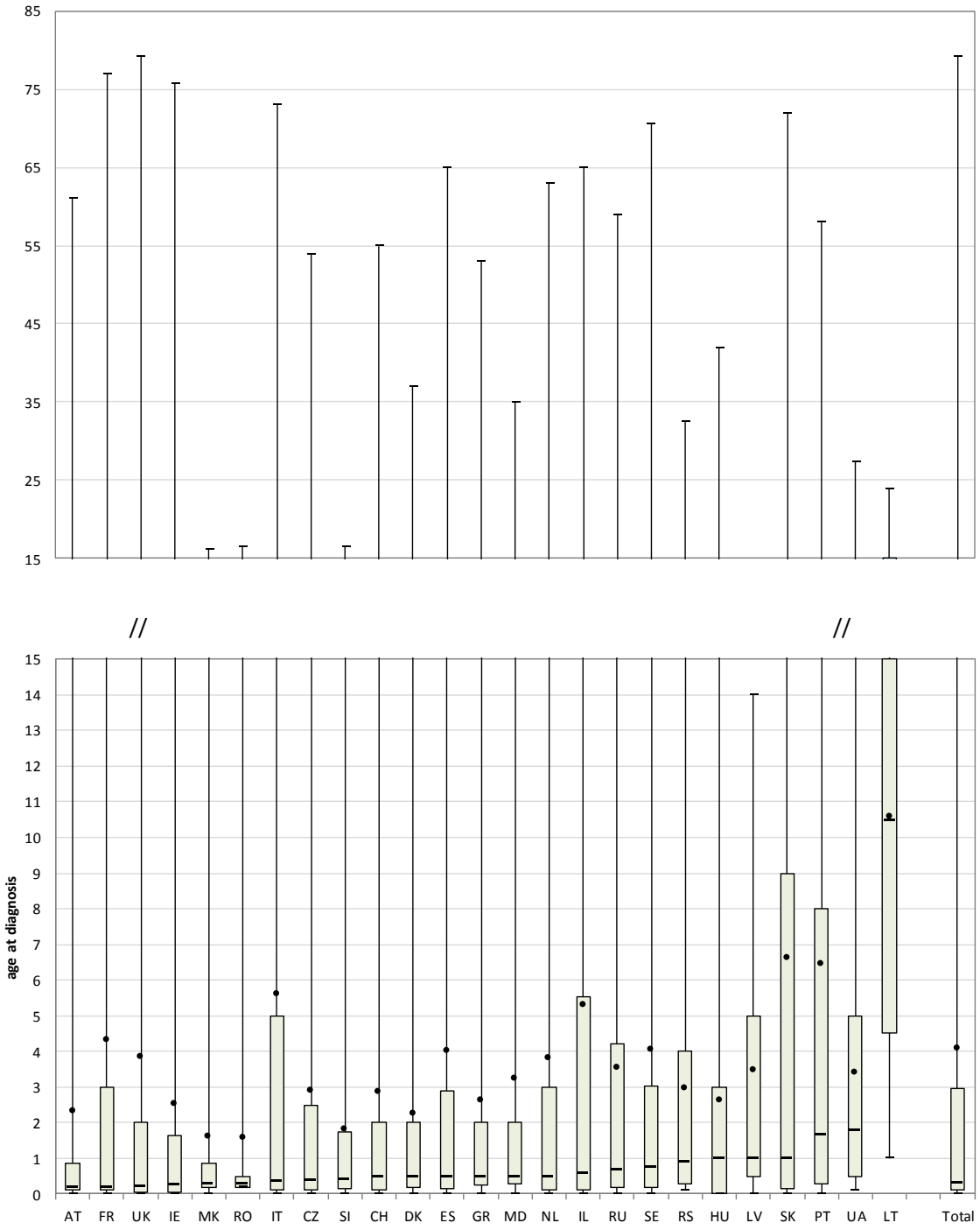
Table 2.1 Age at diagnosis (in years): descriptive statistics, by country and overall. All patients seen in 2014.

Country	N	N miss	Mean (average age at diagnosis)	Min (lowest age at diagnosis)	25th pctl (25 % of the patients were diagnosed before this age)	Median (half the patients were diagnosed before this age)	75th pctl (75% of the patients were diagnosed before this age)	Max (highest age at diagnosis)
Austria	624	63	2.34	0.0	0.10	0.20	0.87	61.00
Czech Republic	599	0	2.91	0.0	0.10	0.40	2.50	53.90
Denmark	459	0	2.25	0.0	0.17	0.50	2.00	37.00
France	6047	322	4.33	0.0	0.10	0.20	3.00	77.00
Greece	494	13	2.64	0.0	0.25	0.50	2.00	53.00
Hungary	428	129	2.65	0.0	0.00	1.00	3.00	42.00
Ireland	942	0	2.54	0.0	0.06	0.28	1.63	75.83
Israel	540	7	5.31	0.0	0.11	0.60	5.54	65.00
Italy	4679	301	5.60	0.0	0.11	0.36	5.00	72.97
Latvia	37	1	3.49	0.0	0.50	1.00	5.00	14.00
Lithuania	12	0	10.58	1.0	4.50	10.5	15.00	24.00
Rep of Macedonia	100	0	1.62	0.0	0.20	0.30	0.85	16.20
Rep of Moldova	61	0	3.25	0.0	0.30	0.50	2.00	35.00
The Netherlands	1293	85	3.81	0.0	0.10	0.50	3.00	63.00
Portugal	251	7	6.47	0.0	0.30	1.70	8.00	58.00
Romania	40	0	1.58	0.2	0.20	0.30	0.50	16.50
Russian Federation	2116	5	3.55	0.0	0.19	0.72	4.20	58.95
Serbia	149	5	2.99	0.1	0.30	0.90	4.00	32.50
Slovak Republic	200	41	6.62	0.0	0.16	1.00	9.00	72.00
Slovenia	81	3	1.82	0.0	0.15	0.45	1.75	16.50
Spain	1435	46	4.01	0.0	0.15	0.50	2.90	65.00
Sweden	614	12	4.06	0.0	0.19	0.79	3.04	70.61
Switzerland	633	103	2.86	0.0	0.10	0.50	2.00	55.00
Ukraine	107	0	3.43	0.1	0.50	1.80	5.00	27.40
United Kingdom	9298	132	3.87	0.0	0.06	0.25	2.00	79.30
Total	31239	1275	4.08	0.0	0.10	0.33	2.97	79.30

Note: For Hungary, Slovak Republic and Switzerland the information on age at diagnosis is missing for more than 10% of the patients.

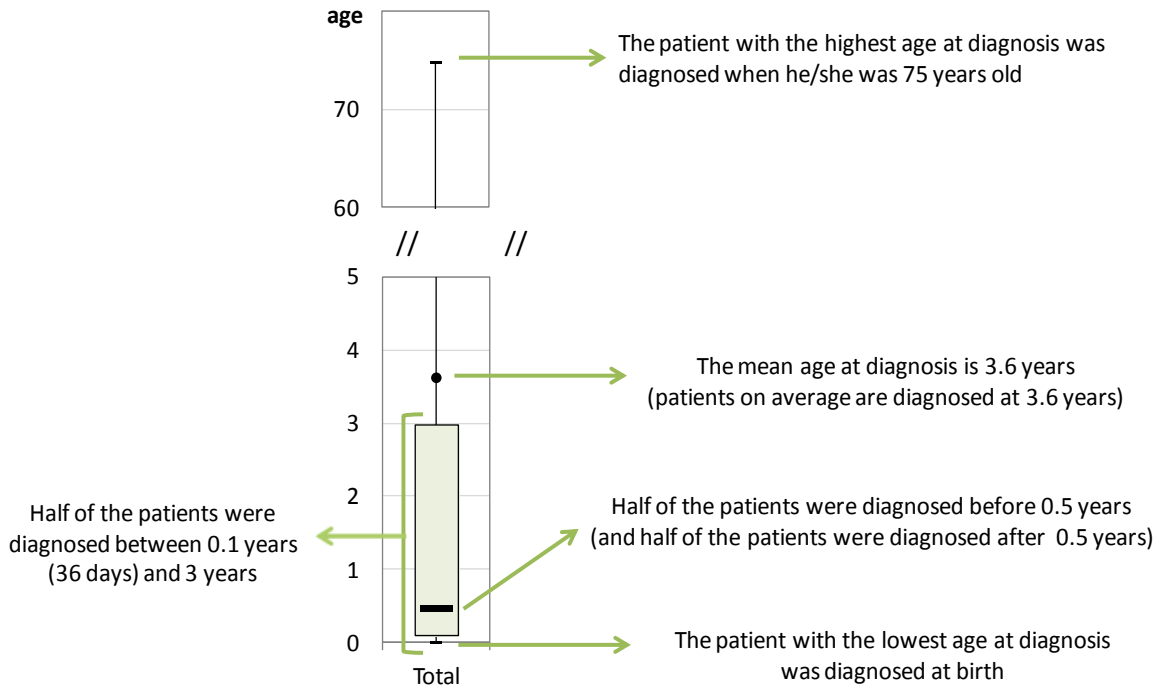
This table shows the descriptive statistics for age at diagnosis by country and overall. For prenatal diagnoses (children diagnosed before birth), the age at diagnosis has been set to 0.

Figure 2.1 Age at diagnosis (in years): box-plot, by country and overall. All patients seen in 2014.



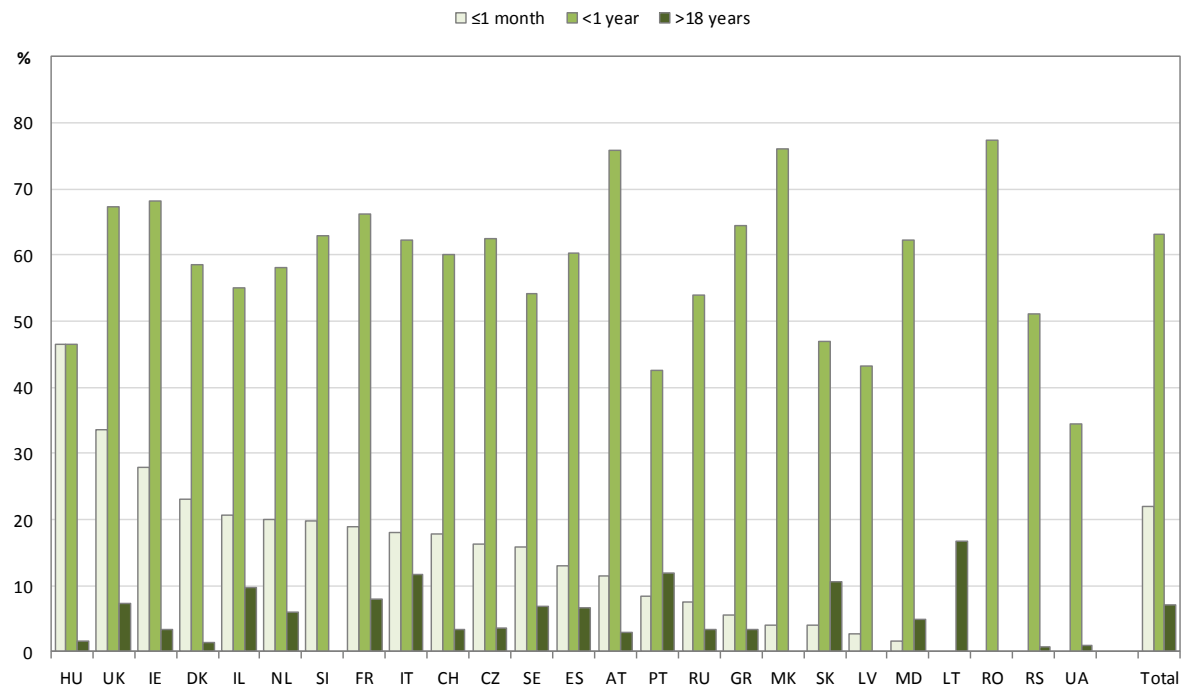
Note: For Hungary, Slovak Republic and Switzerland the information on age at diagnosis is missing for more than 10% of the patients.

This box-plot is a graphic representation of age at diagnosis as detailed in table 2.1. For each country the dash (black line crossing the blue box) is the median, the black dot is the mean and the whiskers (vertical lines with a T-shaped end) are the minimum and the maximum. Please note that the vertical axis is interrupted to emphasise the change of scale in the upper part of the graph. The figure on the next page explains how to read the box.



Note: This is an example of how to read a boxplot. The numbers used in this figure are not real and do not refer to figure 2.1.

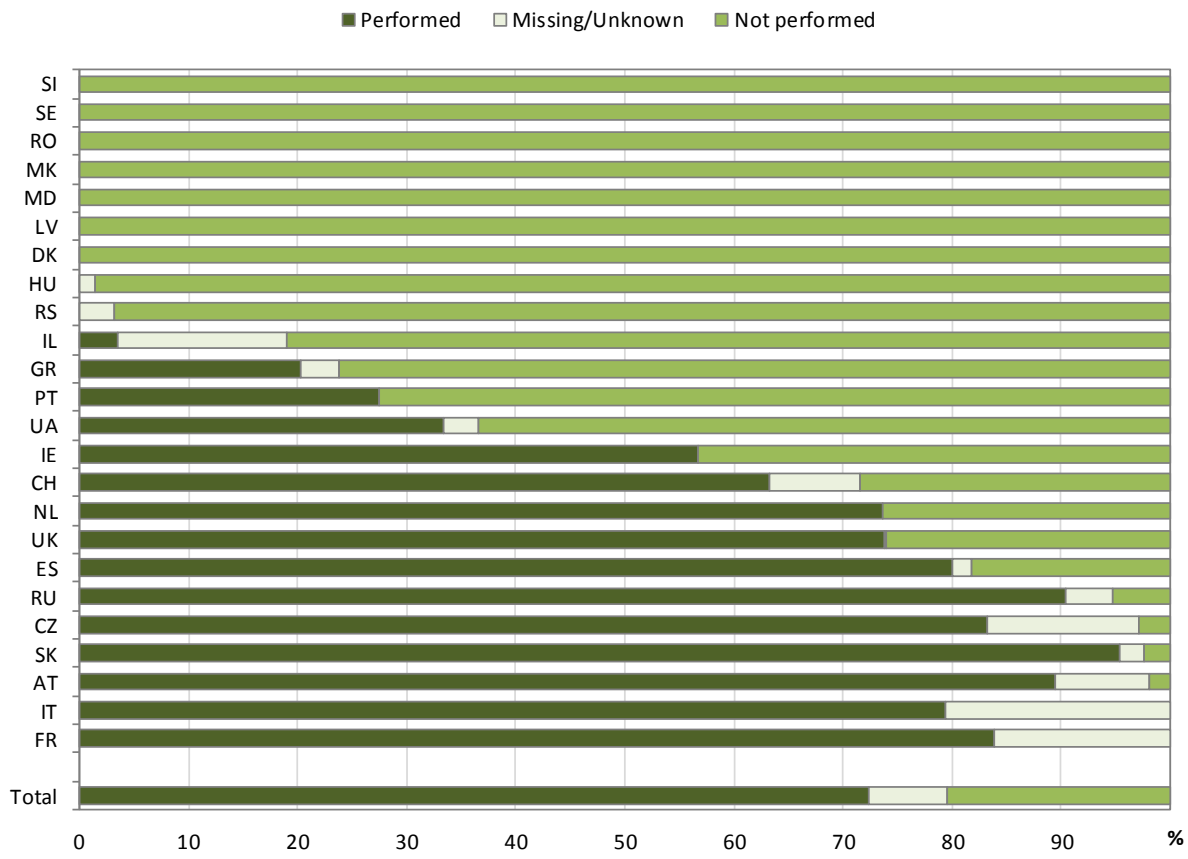
Figure 2.2 Proportion of patients diagnosed at age 1 month or younger, younger than 1 year and older than 18 years, by country and overall. All patients seen in 2014.



Note: For Hungary, Slovak Republic and Switzerland the information on age at diagnosis is missing for more than 10% of the patients.

This graphs shows age at diagnosis in subgroups. The vertical bars represent how many patients (as a percentage) were diagnosed within the first month of life (grey), within the first year of life (light green), and after 18 years of age (dark green). Note that the diagnoses included in the sub-group for within 1 month are also part of the diagnoses in the sub-group for within the first year, and that diagnoses between 1 year and 18 years are not shown on the graph, therefore the bars do not sum to 100%.

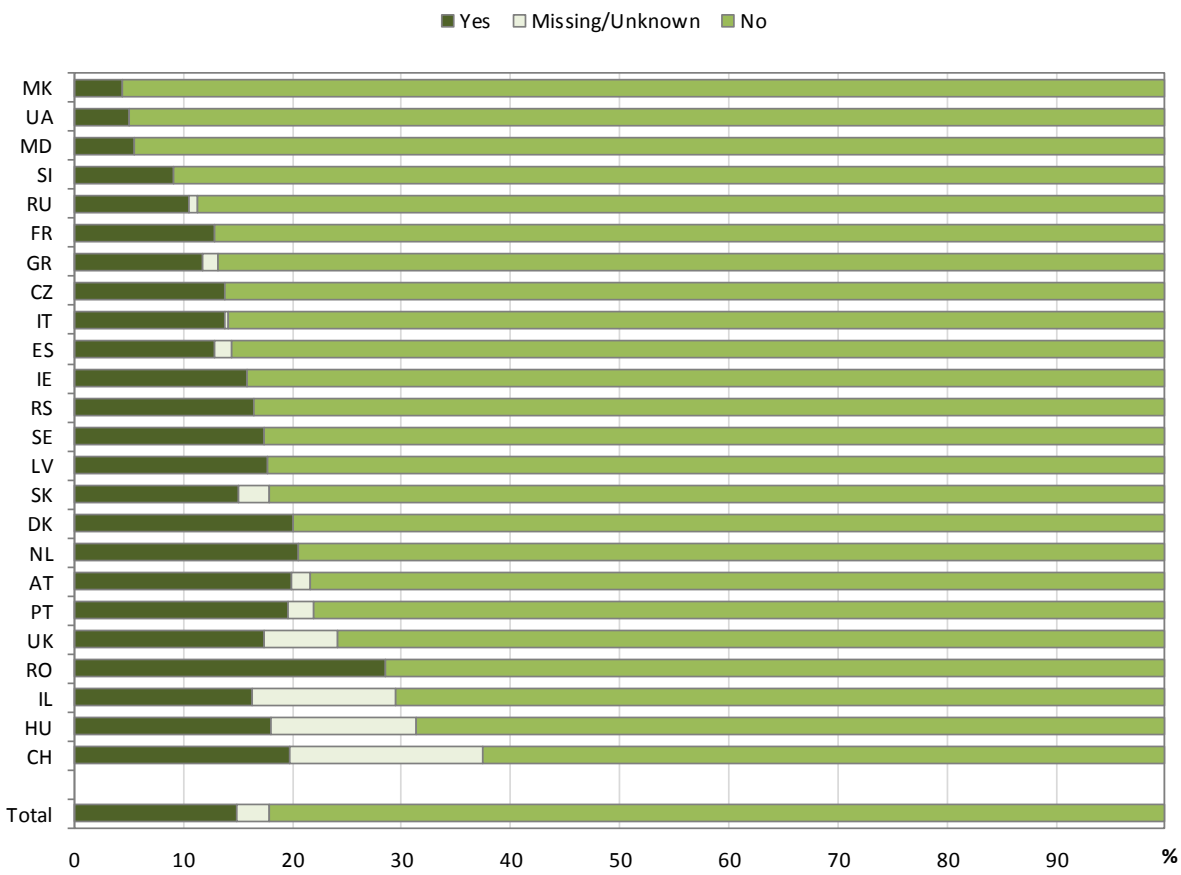
Figure 2.3 Proportion of patients who underwent neonatal screening, by country and overall. Patients 5 years old or younger seen in 2014.



Note: For Czech Republic, Israel and Italy the information on neonatal screening is missing for more than 10% of the patients.
Czech Republic: positive answers ("neonatal screening performed") are reported when neonatal screening is one of the factors that led to CF diagnosis.
France: neonatal screening is recorded only if it is part of the diagnosis.
United Kingdom: new born screening has been introduced for all babies born across the UK since 2007. The data above indicate that the CF diagnosis was suggested by neonatal screening.

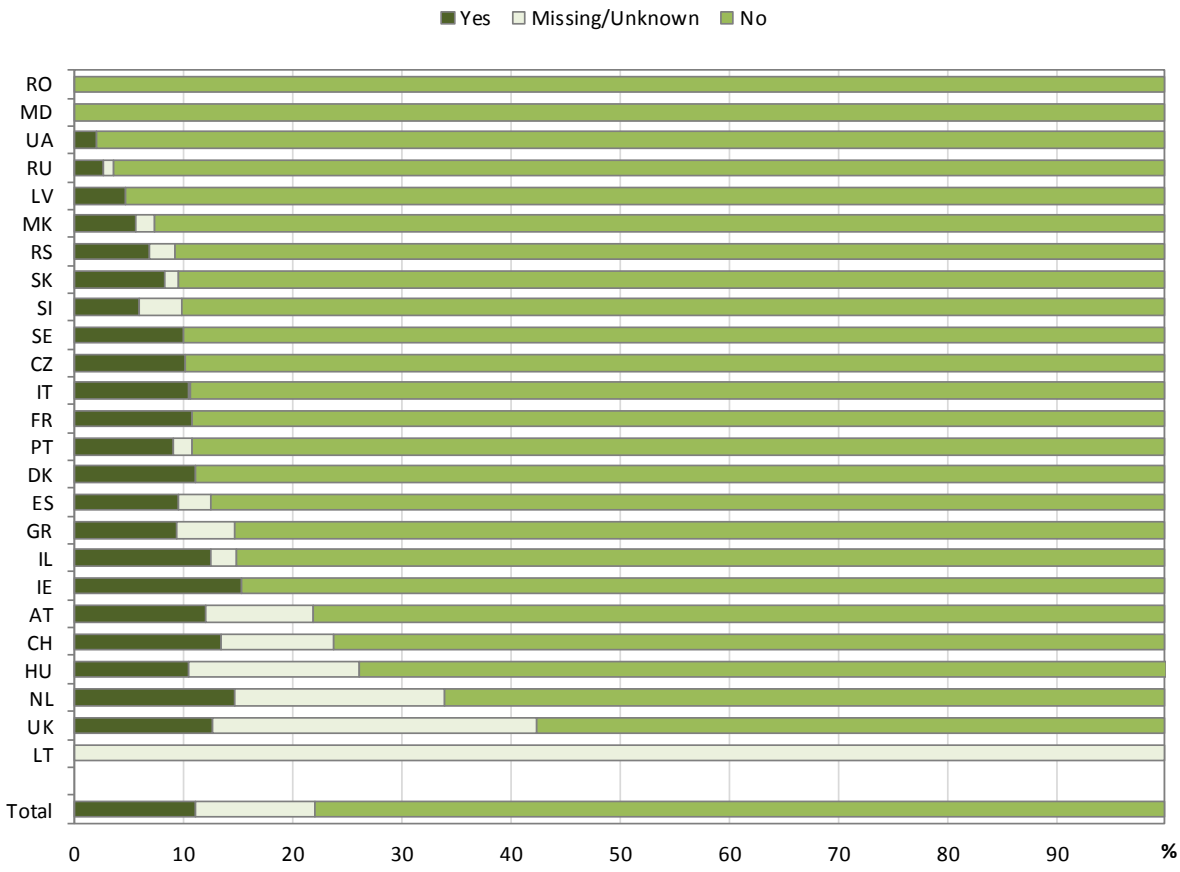
This graph shows the percentage of patients of 5 years old or younger in 2014 who were screened at birth, (see country specific notes above). Dark green horizontal bars represent newborn screening "performed", light green ones "not performed". This graph shows that in some countries there is no newborn screening and that in others, in the five years previous to 2014, almost all the CF patients underwent newborn screening. In total, almost 75% of all children of 5 years old or younger registered in the ECFSPR in 2014 underwent newborn screening, but this estimate reflects the fact that not all the countries perform newborn screening.

Figure 2.4 Patients with meconium ileus, by country and overall. Patients aged 10 years or younger.



Note: For Hungary, Israel and Switzerland the information on meconium ileus is missing for more than 10% of the patients.

Figure 2.5 Patients with meconium ileus, by country and overall. Patients aged 11 years or older.



Note: For Hungary, Lithuania, Switzerland, The Netherlands and United Kingdom the information on meconium ileus is missing for more than 10% of the patients.

These two graphs show the prevalence of meconium ileus (operated or not) at birth in two age groups: 0 to 10 years (fig 2.4) and 11 years or older (fig 2.5). Overall, the proportion of child patients (≤10 years) with meconium ileus is higher compared to the older age group (>10 years). This difference is not due to an increase in the prevalence of meconium ileus in the younger generations, but could be due to the fact that some older patients with meconium ileus have died, and are therefore not present in the current data collection (which refers to patients seen in 2014). The graphs also show that the frequency of reported meconium ileus varies between countries.

3. Genetics

Cystic fibrosis is caused by mutations of the CFTR gene; one on each allele. One is inherited from the mother and one from the father. If both mutations are the same, the person is said to be homozygous for this mutation. If these are two different mutations, the person is considered to be heterozygous.

We supplied the countries with a list of the 1600 most common mutations based on the Cystic Fibrosis Mutation database (CFTR1). If the patient had a mutation that was not present in the database, the country had the possibility to enter the name of the mutation as free text. During the data cleaning process the genotypes not on our list were checked for obvious misspellings or alternative names and, if identified as a known mutation, renamed. Although there are different naming conventions for mutations, we use the original mutation name (legacy name) in this report, since more than 90% of the mutations in the database use this nomenclature.

If DNA analysis to look for CFTR mutations was never carried out, we asked the countries to report “Not done” in the genotype field. If DNA analysis was done but only one or no mutations were found, we asked the countries to write “Unknown” for the un-identified mutations. Please note that there are differences from country to country in how DNA testing is carried out; some countries use standard kits that test only a limited number of common mutations (e.g. 28), and other countries perform DNA analyses of the whole gene until the mutation is identified.

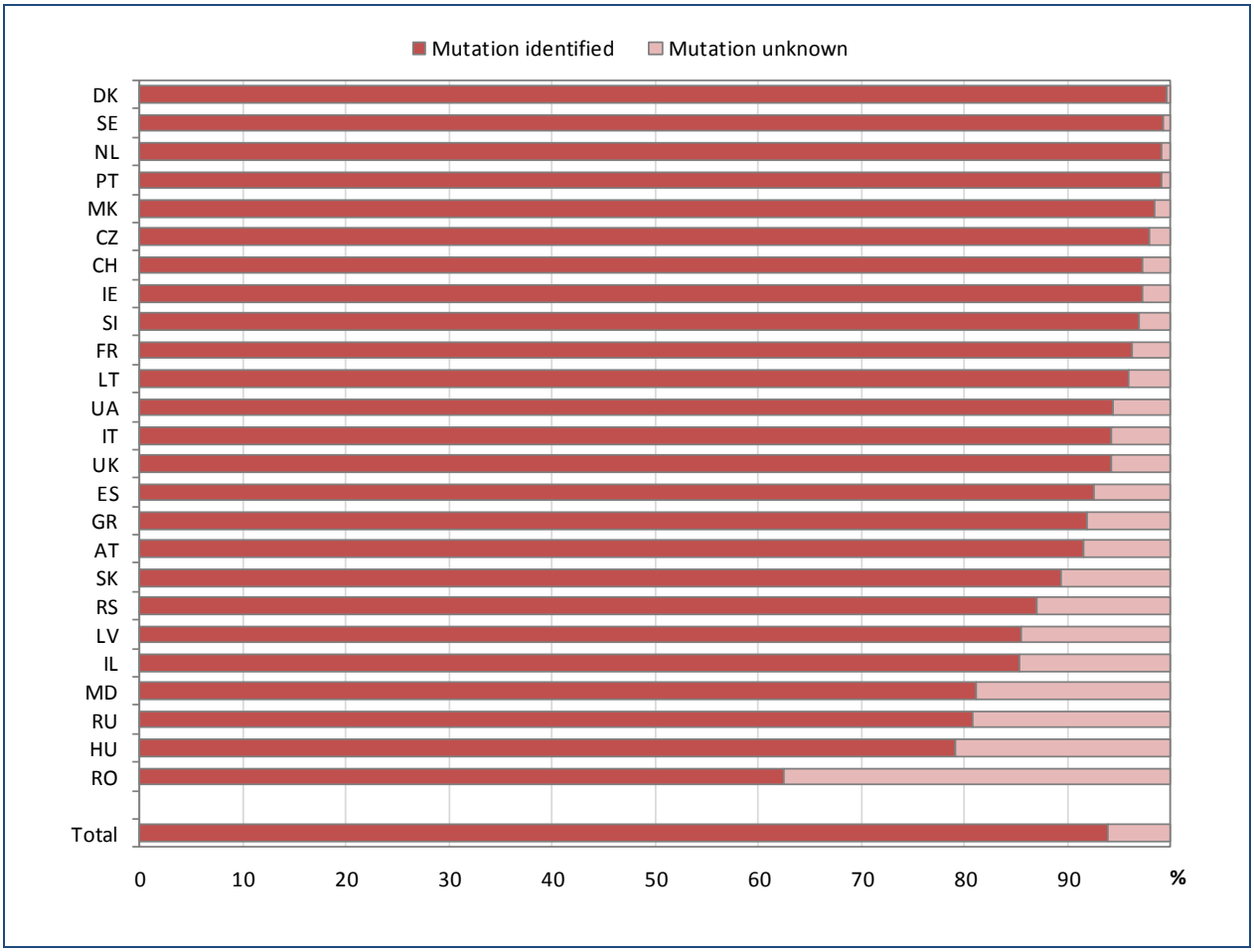
Table 3.1 Proportion of patients with DNA analysis and the result of this, by country and overall. All patients seen in 2014.

Country	N	Genotyping			Among genotyping done	
		not done	done	unknown	two mutations identified	at least one mutation unknown
		number (%)	number (%)	number (%)	number (%)	number (%)
Austria	687	2 (0.29)	685 (99.71)	0 (0)	603 (88.03)	82 (11.97)
Czech Republic	599	1 (0.17)	598 (99.83)	0 (0)	580 (96.99)	18 (3.01)
Denmark	459	0 (0)	459 (100)	0 (0)	457 (99.56)	2 (0.44)
France	6369	0 (0)	6369 (100)	0 (0)	6042 (94.87)	327 (5.13)
Greece	507	0 (0)	507 (100)	0 (0)	444 (87.57)	63 (12.43)
Hungary	557	17 (3.05)	539 (96.77)	1 (0.18)	375 (69.57)	164 (30.43)
Ireland	942	0 (0)	942 (100)	0 (0)	903 (95.86)	39 (4.14)
Israel	547	1 (0.18)	546 (99.82)	0 (0)	440 (80.59)	106 (19.41)
Italy	4980	24 (0.48)	4956 (99.52)	0 (0)	4463 (90.05)	493 (9.95)
Latvia	38	0 (0)	38 (100)	0 (0)	27 (71.05)	11 (28.95)
Lithuania	12	0 (0)	12 (100)	0 (0)	11 (91.67)	1 (8.33)
Rep of Macedonia	100	1 (1.00)	99 (99.00)	0 (0)	96 (96.97)	3 (3.03)
Rep of Moldova	61	0 (0)	61 (100)	0 (0)	43 (70.49)	18 (29.51)
The Netherlands	1378	15 (1.09)	1363 (98.91)	0 (0)	1342 (98.46)	21 (1.54)
Portugal	258	2 (0.78)	256 (99.22)	0 (0)	251 (98.05)	5 (1.95)
Romania	40	0 (0)	40 (100)	0 (0)	20 (50.00)	20 (50.00)
Russian Federation	2121	234 (11.03)	1887 (88.97)	0 (0)	1302 (69.00)	585 (31.00)
Serbia	154	7 (4.55)	147 (95.45)	0 (0)	115 (78.23)	32 (21.77)
Slovak Republic	241	0 (0)	241 (100)	0 (0)	197 (81.74)	44 (18.26)
Slovenia	84	2 (2.38)	82 (97.62)	0 (0)	78 (95.12)	4 (4.88)
Spain	1481	3 (0.20)	1478 (99.80)	0 (0)	1290 (87.28)	188 (12.72)
Sweden	626	0 (0)	626 (100)	0 (0)	617 (98.56)	9 (1.44)
Switzerland	736	7 (0.95)	728 (98.91)	1 (0.14)	699 (96.02)	29 (3.98)
Ukraine	107	0 (0)	107 (100)	0 (0)	96 (89.72)	11 (10.28)
United Kingdom	9430	<5	9411 (99.8)	18 (0.19)	8600 (91.38)	811 (8.62)
Total	32514	317 (0.97)	32177 (98.96)	20 (0.06)	29091 (90.41)	3086 (9.59)

Note: For United Kingdom, when the number of patients is less than 5 the information is suppressed.

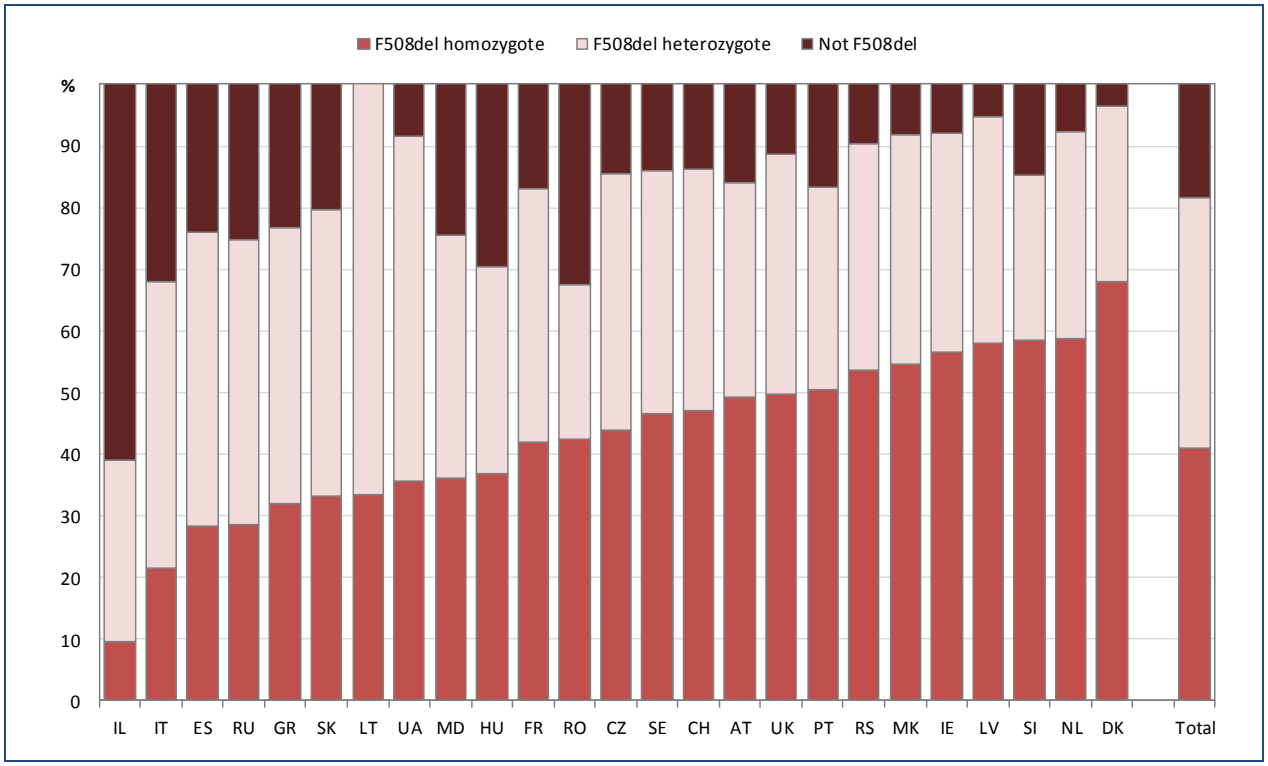
The table shows how many patients underwent DNA analysis to identify the CFTR mutations (column “genotyping done”) and, for those patients, how many patients had both mutations identified (column “two mutations identified”) and for how many one or both mutations remained unidentified (column “at least one mutation unknown”).

Figure 3.1 Proportion of identified mutations, by country and overall. Only patients with DNA analysis.



This graph shows the percentage of mutations that are not identified (unknown in light pink) after DNA analysis, by country and overall. One “allele” means one of the two CFTR genes. The number of non-identified alleles varies greatly from country to country; this is partly due to the different approaches to DNA testing. Overall, more than 5% of mutations remain unidentified after DNA analysis, leaving 9.59% of the patients with at least one mutation unidentified.

Figure 3.2 Prevalence of F508del homozygous and heterozygous patients, by country and overall. All patients seen in 2014.



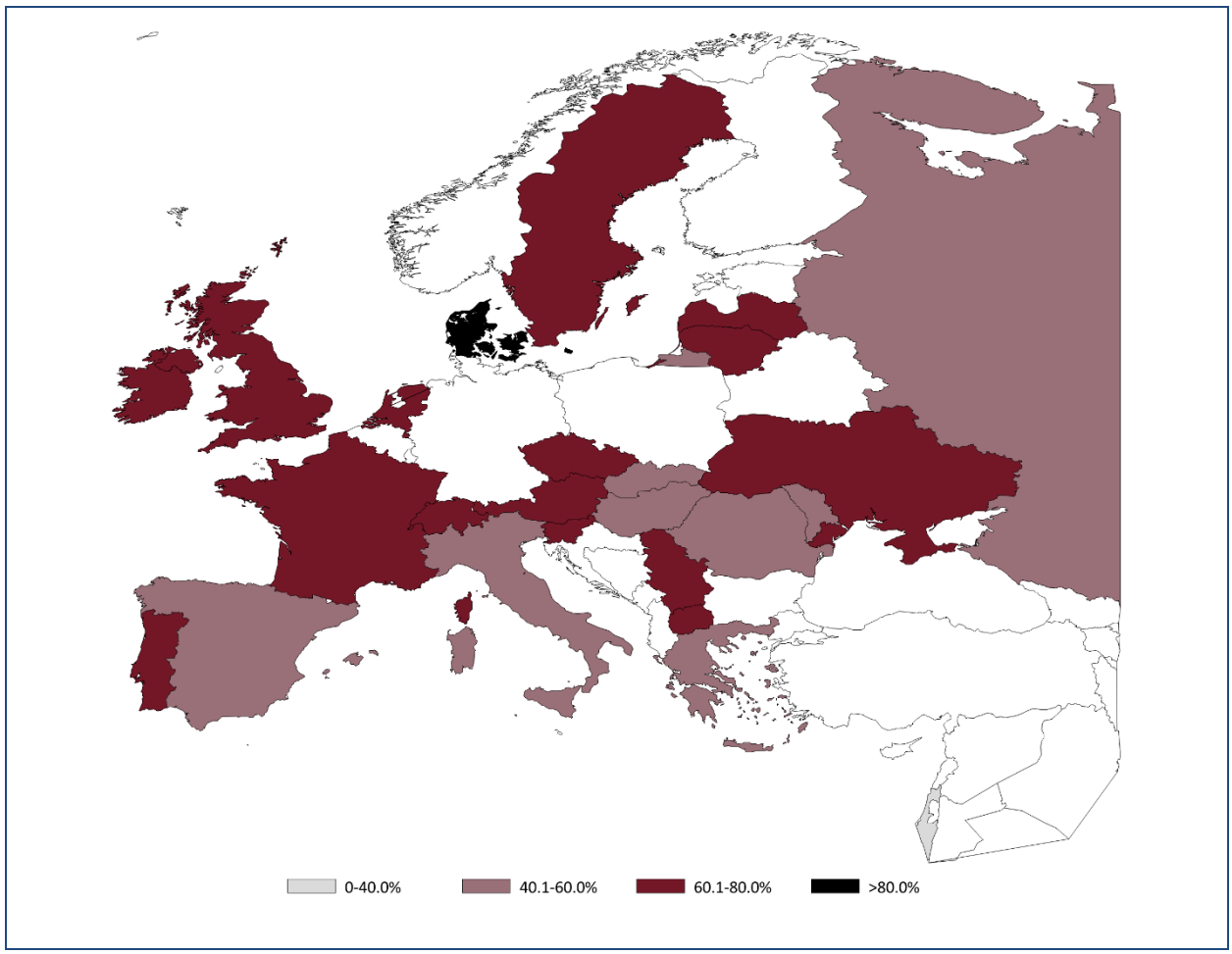
F508del is the name of the most commonly occurring CFTR mutation in the world. Patients who carry two F508del mutations are often described as having “classic CF”, but other combinations of mutations may cause the same degree of disease. We have grouped the patients in F508del homozygous (have two F508del mutations), F508del heterozygous (have one F508del mutation and another mutation, different from F508del), and patients without F508del mutations. Only patients for whom the genotype is known have been included in this graph. “Unknown” mutations have been classified as “other”, since F508del is included in all genotyping kits and would have been identified. Please note that the genotype grouping in this graph does not reflect the severity of the disease in the countries.

Table 3.2 Allelic frequencies of the 15 most common mutations in the ECFSPR database.

Mutation name	Number of alleles	Percentage among tested	Country with highest allele frequency
F508del	39412	61.24	Denmark (82.24%)
G542X	1783	2.77	Rep of Macedonia (6.06%)
N1303K	1341	2.08	Italy (5.62%)
G551D	909	1.41	Ireland (8.70%)
W1282X	762	1.18	Israel (23.08%)
R117H	708	1.1	United Kingdom (2.33%)
2789+5G->A	610	0.95	Italy (2.88%)
1717-1G->A	580	0.9	Switzerland (2.75%)
3849+10kbC->T	527	0.82	Lithuania (16.67%)
621+1G->T	464	0.72	Greece (6.21%)
R553X	461	0.72	Lithuania (8.33%)
CFTRdele2,3	413	0.64	Czech Republic (6.10%)
2183AA->G	364	0.57	Italy (2.00%)
R1162X	364	0.57	Slovenia (4.88%)
D1152H	361	0.56	Israel (4.95%)

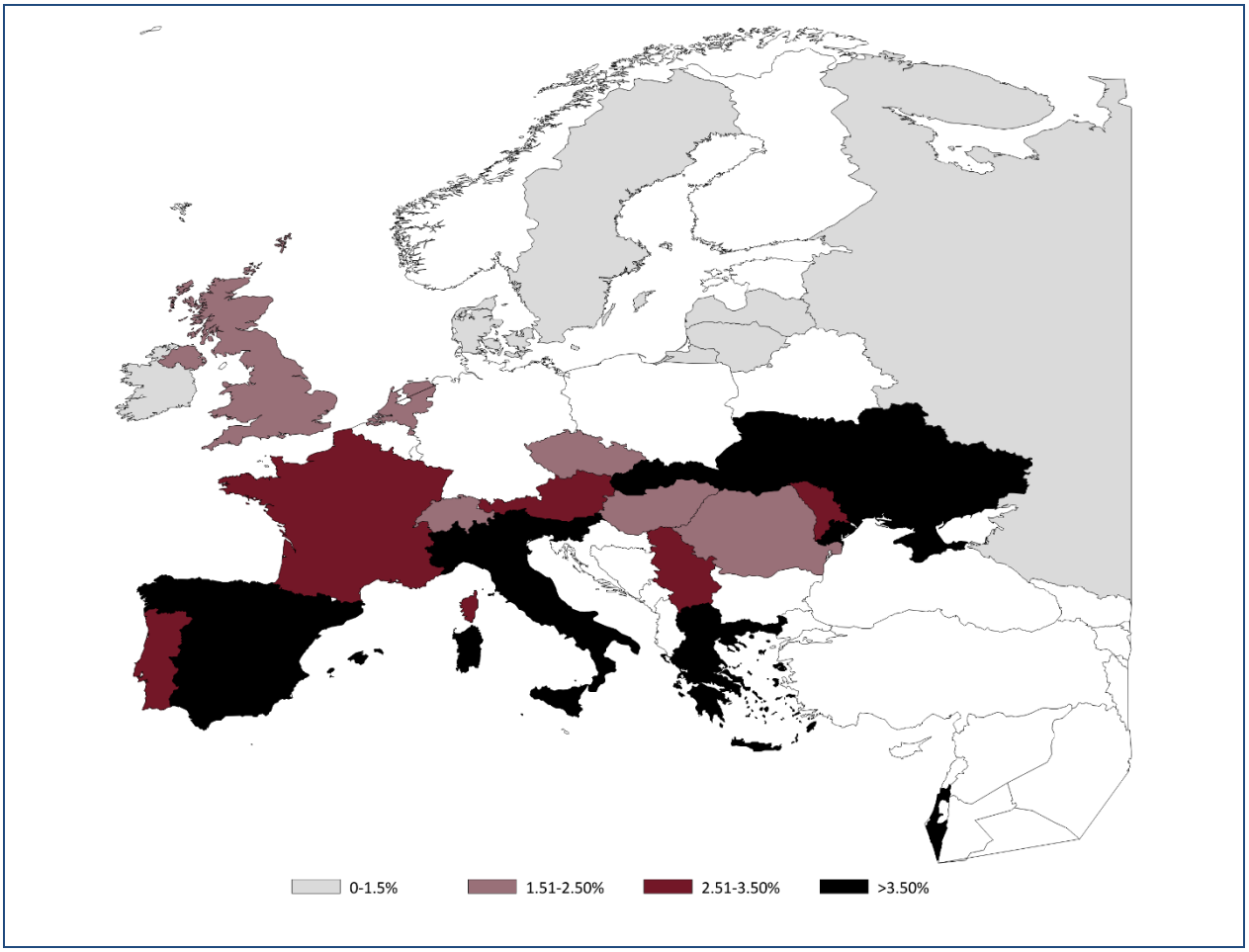
This table presents the allele frequency of the 15 most commonly occurring mutations found in the ECFSPR database. The last column indicates in which country the particular mutation is most frequent. F508del is by far the most frequent mutation. Additionally, since F508del is included in all genetic screening tests, this is also the mutation with the highest detection rate.

Figure 3.3 Geographical distribution of mutation F508del.



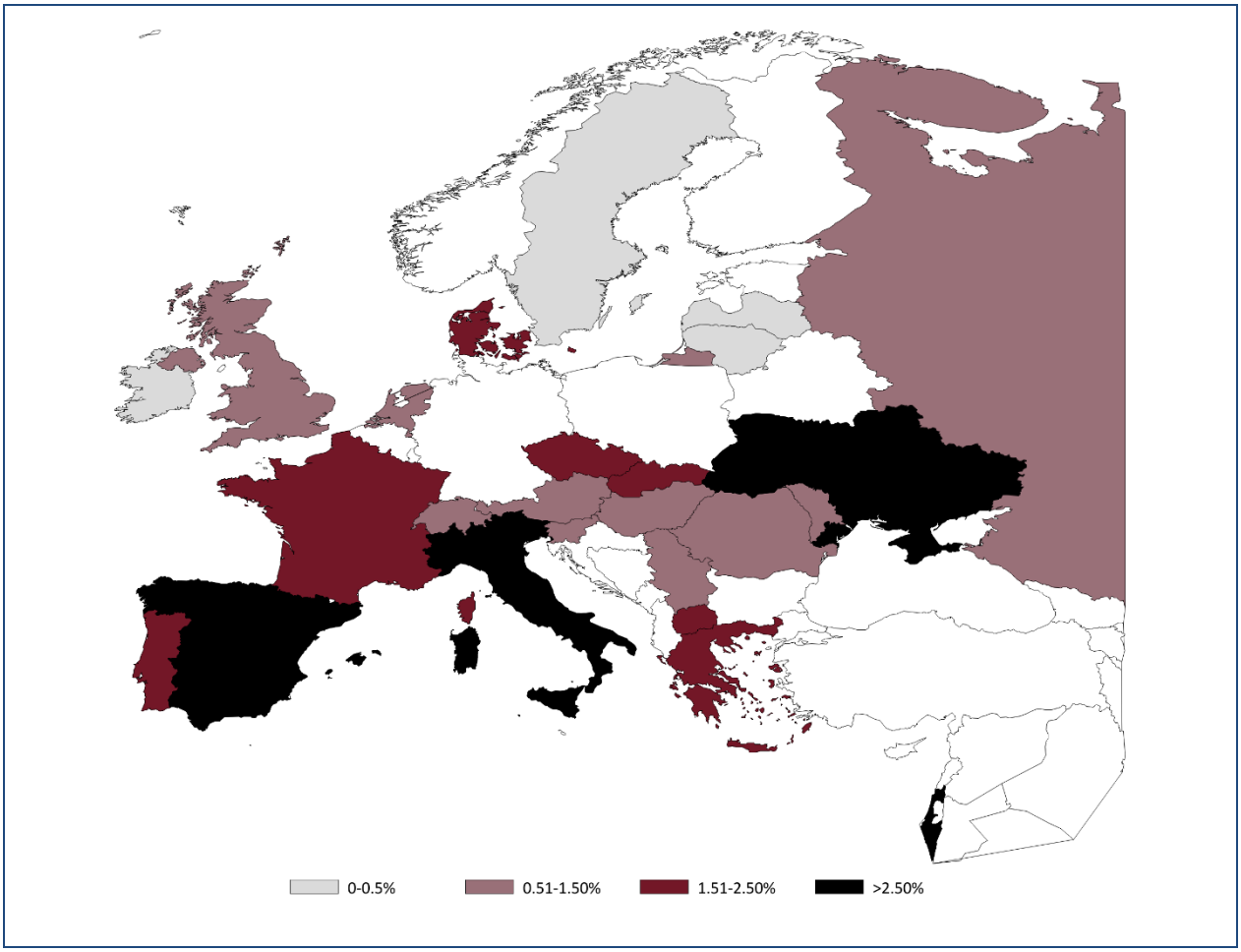
Although this mutation is the most common in all countries, the allele frequency still varies from 24.27% in Israel to 82.24% in Denmark.

Figure 3.4 Geographical distribution of mutation G542X.



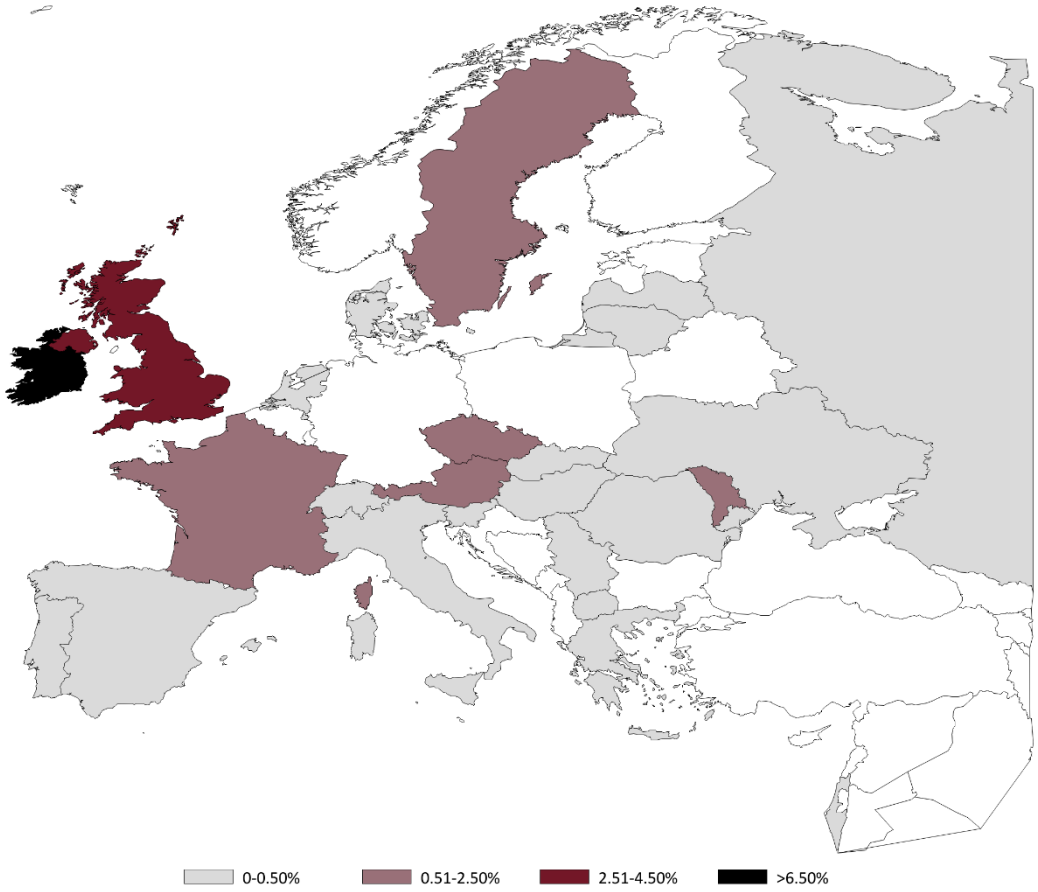
This mutation is very rarely found in Scandinavia (0.76% in Denmark and 0.72% in Sweden, 0.0% in Latvia and Lithuania).

Figure 3.5 Geographical distribution of mutation N1303K.



This mutation is most frequent in Italy (5.62%) and other countries in Southern Europe and in Eastern Europe, but rare in Northern Europe.

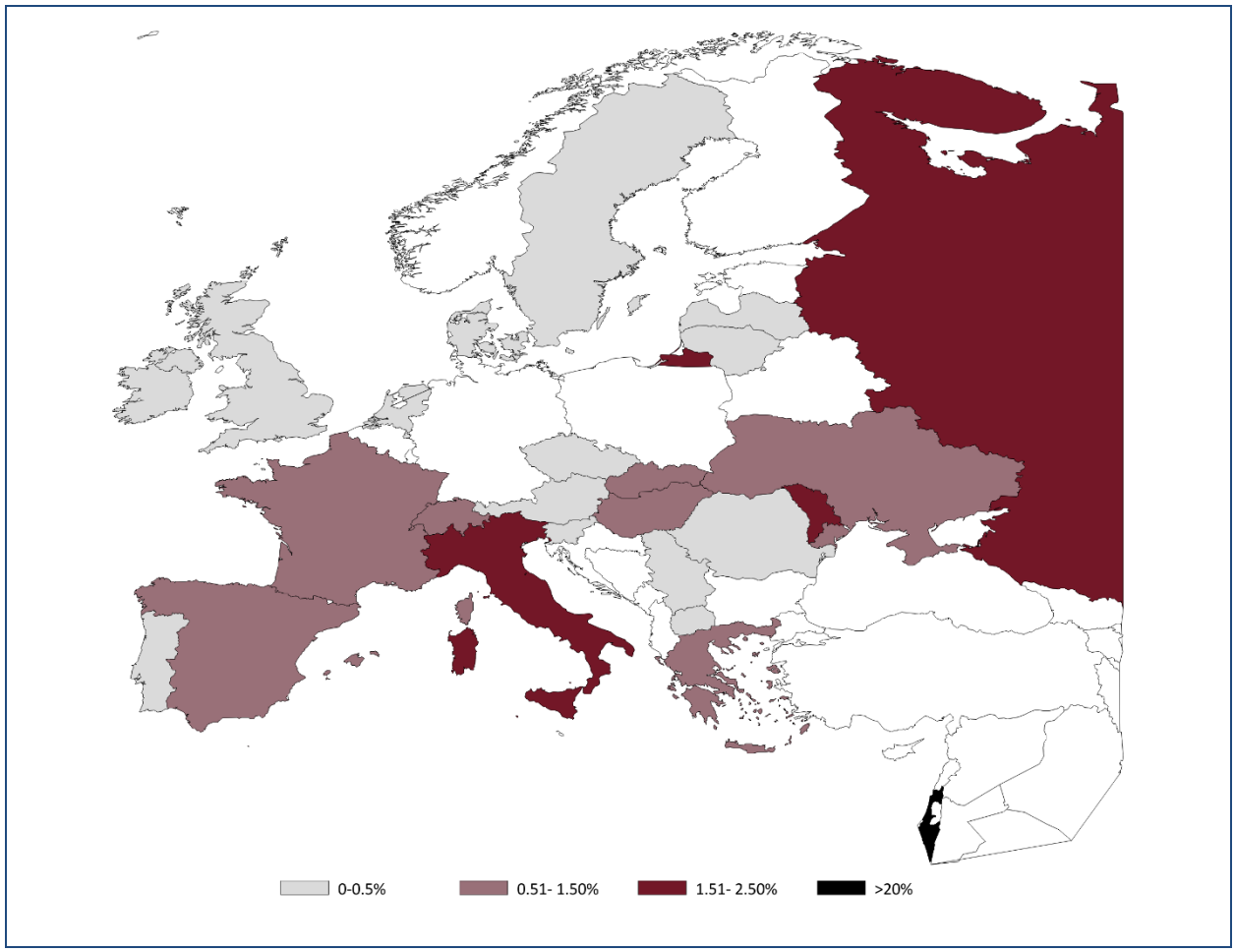
Figure 3.6 Geographical distribution of mutation G551D.



Note: Israel: G551D was not in the mutation panel for 2014, therefore the prevalence is unknown.

This mutation is most frequent in Ireland (8.70%), whereas it is very rare in Southern Europe (less than 0.5%).

Figure 3.7 Geographical distribution of mutation W1282X.



This mutation, of Middle-Eastern origin, is by far most frequent in Israel (23.08%) with a very high allele frequency in Ashkenazi Jews.

4. Lung function

FEV_1 is measured in litres but it is normally expressed as a percentage of the expected value (FEV_1%). The expected value is computed from healthy individuals of the same sex, height and age and is termed the reference population.

In this report we used, for the first time, the Global Lung Function Initiative equations described by Quanjer PH et al. (see Appendix 1, page 120, for full reference). This is the global reference for spirometry and it has been agreed, as part of the CF global harmonisation project, that this is the best way to present lung function. We will continue to use these equations from now on in our reports. In Appendix 3 (page 126) we have also included the outcomes based on the reference populations and equations described by Wang et al. for children, and Hankinson et al. for adults (see Appendix 1, page 120, for full reference).

A FEV1% of 100 means that the lung function measurement is equal to the mean lung function measurement of people of the same age, sex and height of the healthy reference population.

Spirometry, the test that measures FEV_1, requires a certain amount of coordination, and usually cannot be performed until a person with CF is about six years of age. We have therefore computed FEV_1% values only for patients aged 6 years or older.

We asked the countries to report the best FEV_1 recorded throughout the year (according to the FEV_1% computed at the CF centres) to the ECFSPR. A few national registries do not record the best value, but other FEV_1 values that may not be the patient's best that year, so we added a footnote to the tables and graphs describing which FEV_1 was reported from those countries. Research has shown that when comparing groups of patients, the difference between the best FEV_1% and a random value from the same year can be up to 4.3% points[1]. This finding should be taken into consideration when comparing the results. Likewise, as lung function in CF deteriorates with age, differences in FEV_1 may reflect that the CF population of a country is older.

We excluded patients from the analyses on FEV_1 who have had one or more lung transplants, since their lung function does not reflect the severity of their CF lung disease.

[1] Wanyama et al, JCF 2014; 9, S1:428

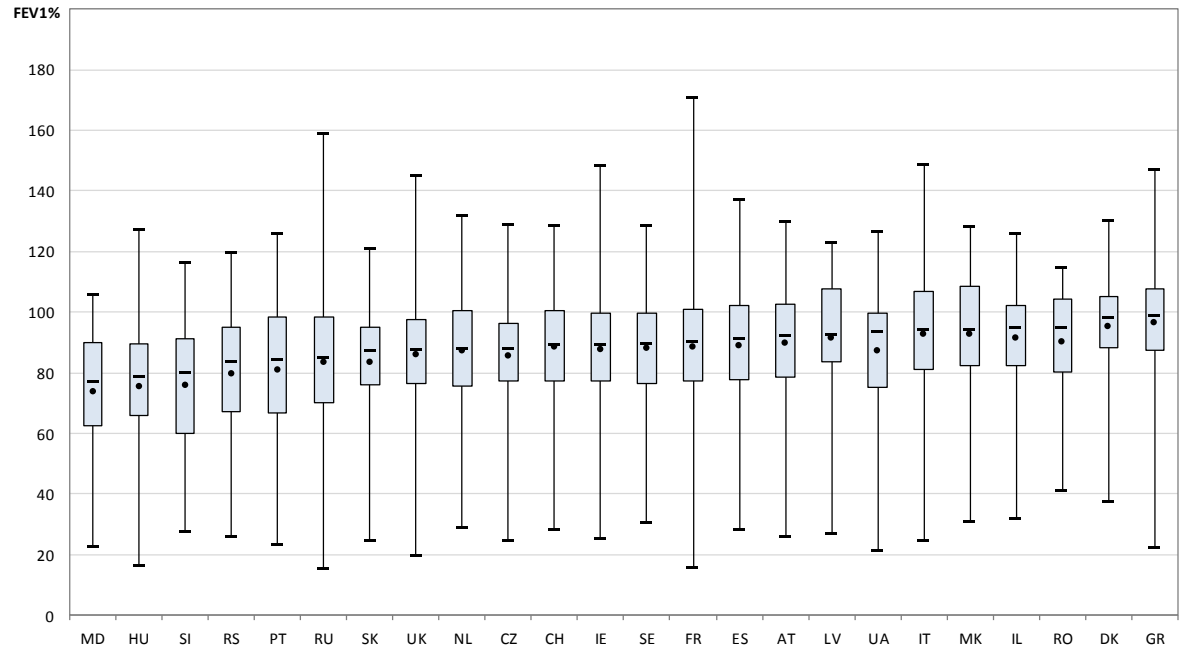
Table 4.1 FEV_1% of predicted: descriptive statistics by country. Patients aged 6-17 years who have never had a lung transplant.

Country	N	N Miss	Mean (average FEV_1%)	Min	25th pctl (25% of patients have FEV_1% below this value)	Median (50% of patients have FEV_1% below this value)	75th pctl (75% of patients have FEV_1% below this value)	Max
Austria	252	3	89.6	26.0	78.4	92.3	102.5	129.9
Czech Republic	201	13	85.7	24.6	77.4	88.2	96.2	128.8
Denmark	140	0	95.2	37.3	88.1	98.3	105.0	130.3
France	2029	103	88.3	16.0	77.4	90.3	101.0	171.0
Greece	130	2	96.4	22.2	87.5	99.0	107.8	147.3
Hungary	207	16	75.6	16.1	65.8	78.6	89.5	127.2
Ireland	358	12	87.5	25.1	77.2	89.5	99.8	148.6
Israel	173	5	91.5	31.9	82.5	94.8	102.1	126.2
Italy	1057	27	92.8	24.9	81.2	94.5	106.7	148.9
Latvia	15	0	91.3	27	83.7	92.9	107.8	123.3
Rep of Macedonia	51	2	92.9	31.2	82.5	94.5	108.7	128.0
Rep of Moldova	22	2	73.6	22.8	62.5	77.1	90.1	105.7
The Netherlands	410	10	87.4	28.8	75.7	88.1	100.6	131.9
Portugal	103	8	81.1	23.4	66.7	84.4	98.4	126.1
Romania	23	0	90.3	41.4	80.4	95.0	104.2	114.5
Russian Federation	534	244	83.5	15.3	70.0	85.1	98.3	158.9
Serbia	74	0	79.6	26.1	67.1	83.7	94.9	119.6
Slovak Republic	76	0	83.5	24.8	76.0	87.2	95.2	121.2
Slovenia	35	0	75.9	27.7	59.9	80.0	91.1	116.5
Spain	517	18	89.1	28.3	77.6	91.5	102.2	137.1
Sweden[1]	163	6	87.9	30.6	76.6	89.9	99.7	128.4
Switzerland	226	4	88.4	28.1	77.4	89.2	100.5	128.7
Ukraine	60	1	87.2	21.2	75.0	93.5	99.5	126.4
United Kingdom[2]	2106	745	85.8	19.7	76.3	87.5	97.4	144.9

[1] Sweden reports FEV_1 collected at the time of the annual review.
[2] United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.

This table shows some descriptive statistics for FEV_1 in children, expressed as % of predicted. Note that patients who have had a lung transplant and children below 6 years of age have been excluded from the analyses.

Figure 4.1 FEV_1% of predicted: box-plot, by country and overall. Patients aged 6-17 years who have never had a lung transplant.



Note: Sweden reports FEV_1 collected at the time of the annual review.
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.

This box-plot is a graphic representation of the FEV_1 in children, expressed as % of predicted, detailed in table 4.1. For each country the dash (black line crossing the blue box) is the median, the black dot is the mean and the whiskers (vertical lines with a T-shaped end) are the minimum and the maximum.

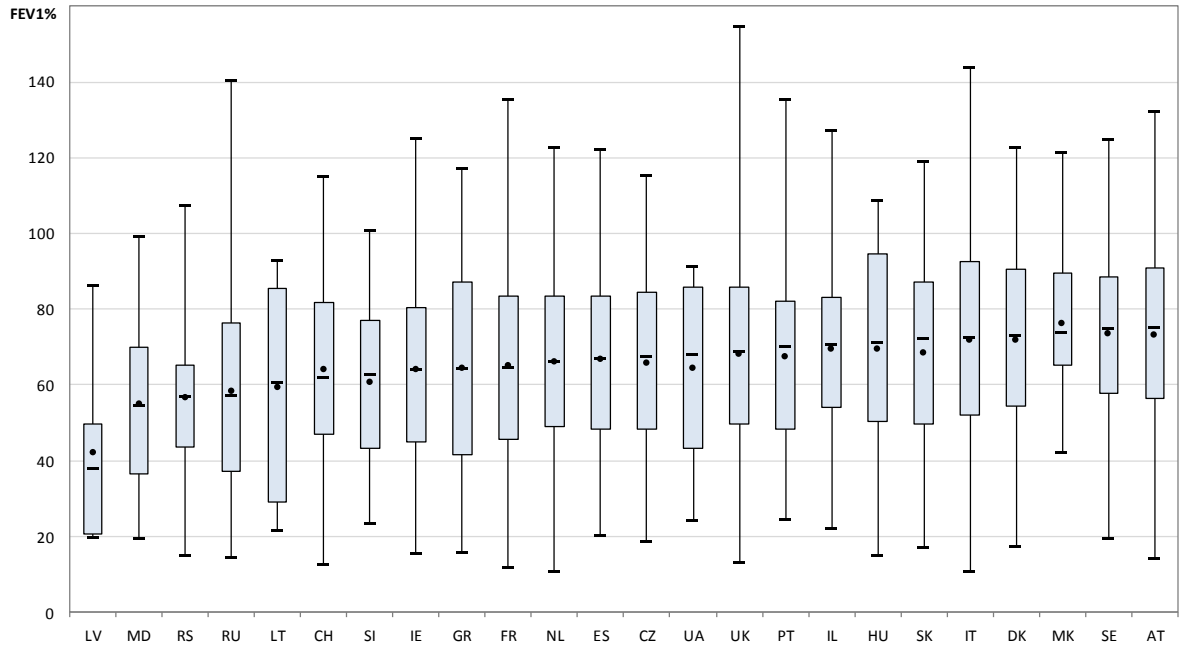
Table 4.2 FEV_1% of predicted: descriptive statistics by country. Patients aged 18 years or older who have never had a lung transplant.

Country	N	N Miss	Mean (average FEV_1%)	Min	25th pctl (25% of patients have FEV_1% below this value)	Median (50% of patients have FEV_1% below this value)	75th pctl (75% of patients have FEV_1% below this value)	Max
Austria	265	2	73.3	14.0	56.3	75.1	90.8	132.4
Czech Republic	132	77	65.8	18.8	48.2	67.4	84.6	115.3
Denmark	222	0	71.8	17.5	54.3	73.2	90.6	122.7
France	2508	62	64.9	11.7	45.7	64.8	83.5	135.2
Greece	185	0	64.3	15.9	41.6	64.3	87.0	117.1
Hungary	162	7	69.6	15.0	50.5	71.1	94.6	108.6
Ireland	329	19	64.0	15.3	44.9	63.9	80.3	125.0
Israel	265	0	69.5	22.2	54.1	70.7	83.2	127.2
Italy	1890	52	71.9	10.8	52.1	72.4	92.7	143.9
Latvia	<10	0	42.1	19.9	20.8	38.0	49.8	86.3
Lithuania	12	0	59.2	21.4	29.2	60.7	85.5	92.9
Rep of Macedonia	22	0	76.1	42.0	65.2	73.7	89.5	121.5
Rep of Moldova	13	0	55.0	19.4	36.5	54.6	69.9	99.3
The Netherlands	638	24	66.1	10.8	49.0	65.9	83.3	122.7
Portugal	82	1	67.4	24.6	48.3	70.0	82.2	135.3
Russian Federation	398	134	58.2	14.3	37.2	57.3	76.4	140.5
Serbia	38	0	56.6	15.2	43.6	56.9	65.2	107.3
Slovak Republic	112	0	68.5	17.2	49.6	72.0	87.3	119.1
Slovenia	22	0	60.7	23.5	43.2	62.6	77.1	101.0
Spain	474	13	66.7	20.0	48.4	67.1	83.6	122.2
Sweden[1]	309	10	73.4	19.5	57.8	75.0	88.6	124.8
Switzerland	303	0	63.9	12.8	46.9	62.1	81.8	115.0
Ukraine	10	1	64.3	24.1	43.1	68.1	85.9	91.4
United Kingdom[2]	3533	1261	68.0	13.0	49.8	68.7	85.7	154.6

[1] Sweden reports FEV_1 collected at the time of the annual review.
[2] United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has one adult patient and is excluded from the table.

This table shows some descriptive statistics for FEV_1 in adults, expressed as % of predicted. Note that patients who have had a lung transplant have been excluded from the analyses.

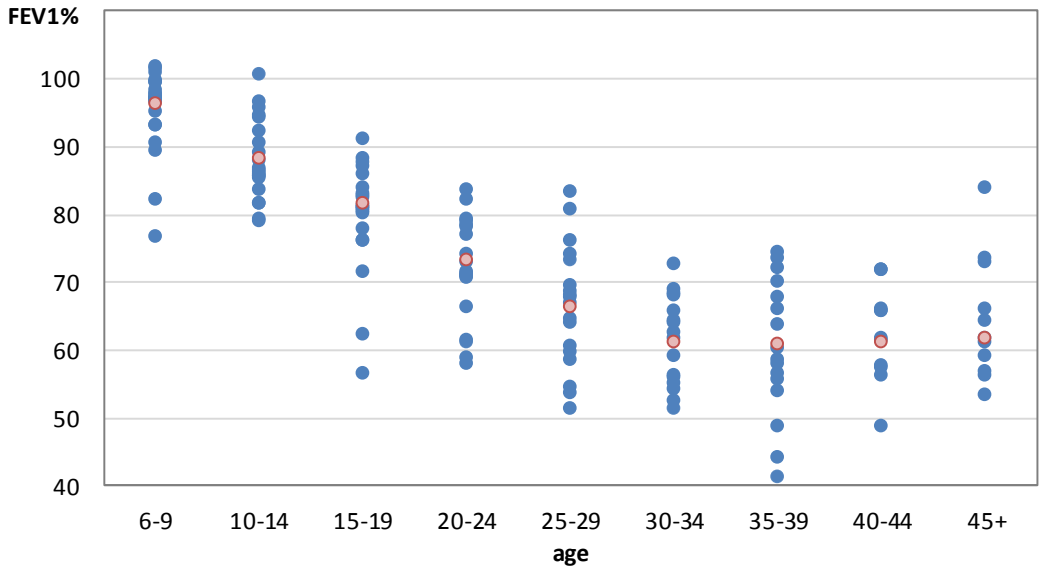
Figure 4.2 FEV_1% of predicted: box-plot by country and overall. Patients aged 18 years or older who have never had a lung transplant.



Note: Sweden reports FEV_1 collected at the time of the annual review.
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has one patient and is excluded from the graph.

This box-plot is a graphic representation of the FEV_1 in adults, expressed as % of predicted, detailed in table 4.2. For each country the dash (black line crossing the blue box) is the median, the black dot is the mean and the whiskers (vertical lines with a T-shaped end) are the minimum and the maximum.

Figure 4.3 Median FEV_1% of predicted by age group and by country. Patients aged 6 years or older who have never had a lung transplant.



Note: We excluded from the analyses those age groups with the number of patients <10.
Note: Not all the countries reported the best FEV_1 value of the year (see tables 4.1 and 4.2).

This graph shows the median FEV_1% (the value that separates the highest and lowest half of the patients) by age group. Each country is represented by a dot (in blue) and the overall estimate is in red. The general pattern shows that the FEV_1% slowly decreases until the age of 30-34, and then levels out. The patients in the oldest age groups are patients that survived, and may therefore represent the patients with less disease severity. There is considerable variability between countries.

Table 4.3 FEV_1% of predicted: descriptive statistics by age group (patients aged 6 years or older) who have never had a lung transplant.

Age at FEV_1 measurement	N	N Miss	Mean	Min	25th pctl	Median	75th pctl	Max
6-9	3089	503	94.7	18	85.3	96.3	105.6	158.9
10-14	3681	434	86.4	23.4	75.9	88.1	98.5	171
15-19	3575	466	78.7	15.2	64.9	81.5	93.8	154.6
20-24	3190	416	71.4	12.5	54.5	73.2	89.5	143.9
25-29	2474	351	65.7	10.8	46.9	66.2	83.8	143.1
30-34	1784	231	62.7	13.1	44.2	61.1	79.7	134.2
35-39	1181	155	62.6	11.7	43.7	60.9	80.4	129.7
40-44	777	130	63.1	13.9	44.1	61.2	81.0	139.2
45+	1142	198	64.5	10.8	44.7	61.8	82.7	137.3

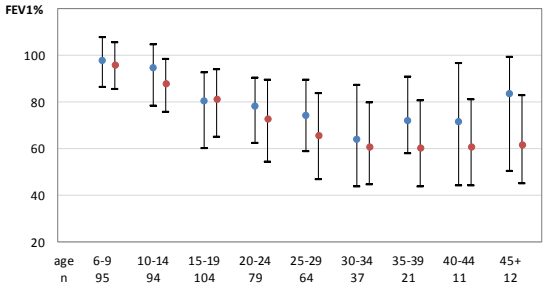
Note: Not every country reported the best FEV_1 value of the year (see tables 4.1 and 4.2).

This table shows FEV_1% by age group for the total data set. The median values reported in this table are shown as red dots in fig 4.3.

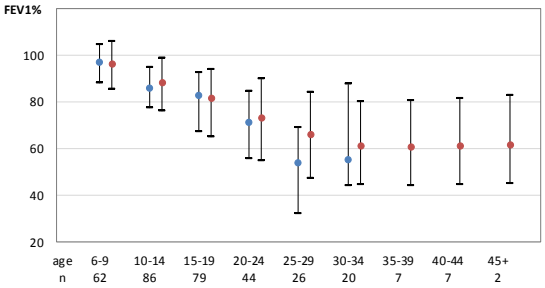
Figure 4.4 Quartiles of FEV_1% of predicted by age group and by country. Patients aged 6 years or older and who have never had a lung transplant.

The figures below show the FEV_1% in different age groups, separately for each country. The dot shows the median, and the whiskers show the 25th and 75th percentiles (the median, the 25th percentile and the 75th percentile are collectively named "quartiles"). In blue are the quartiles for the country, in red are the pooled quartiles computed on all other countries (i.e. excluding that country). We did not compute quartiles where the number of patients is <10 in an age group, so there are no blue dots for those age groups (the number of patients in each age group is shown below the horizontal axis). We therefore excluded Latvia and Lithuania from the graphs because none of the age groups had more than 10 patients.

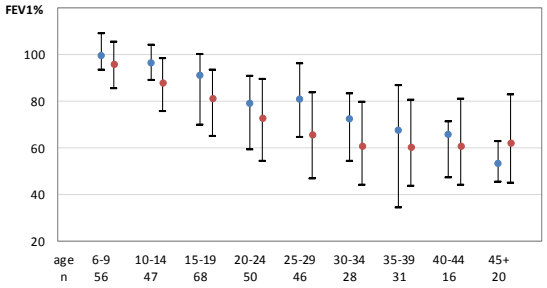
Quartiles of FEV_1%: Austria



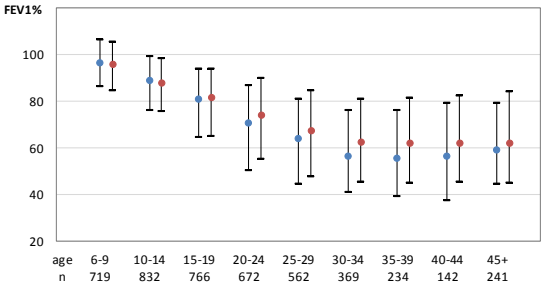
Quartiles of FEV_1%: Czech Republic



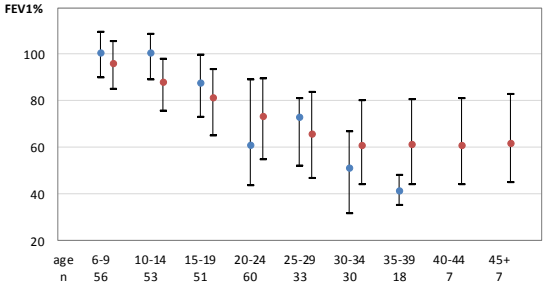
Quartiles of FEV_1%: Denmark



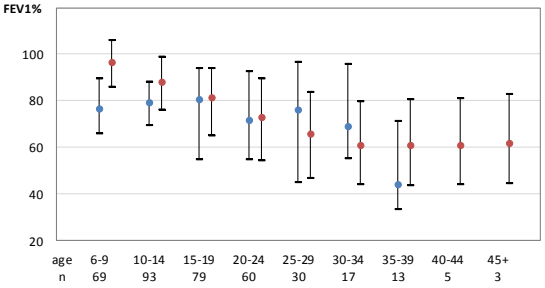
Quartiles of FEV_1%: France



Quartiles of FEV_1%: Greece

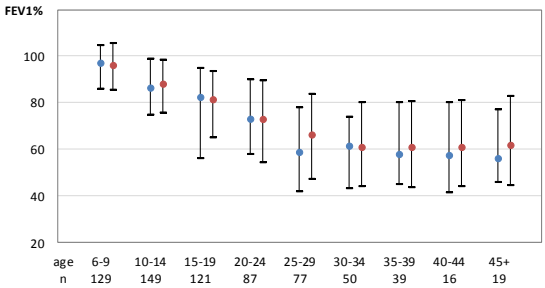


Quartiles of FEV_1%: Hungary

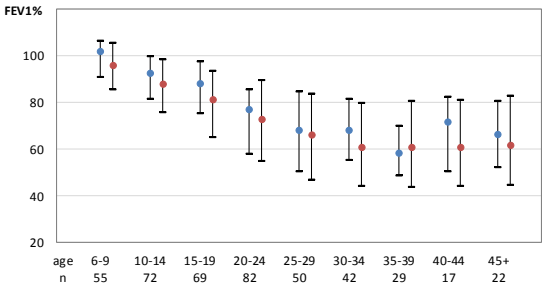


[figure 4.4 continued]

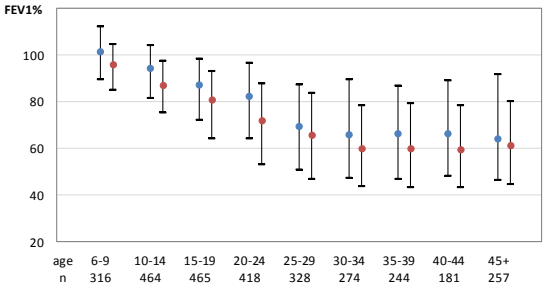
Quartiles of FEV$_1$%: Ireland



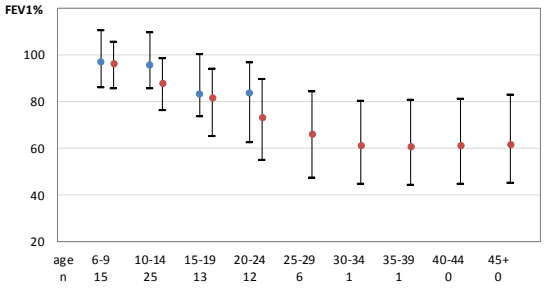
Quartiles of FEV$_1$%: Israel



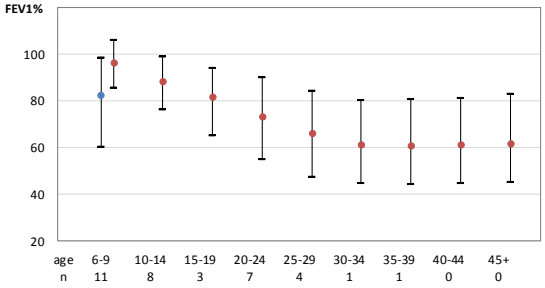
Quartiles of FEV$_1$%: Italy



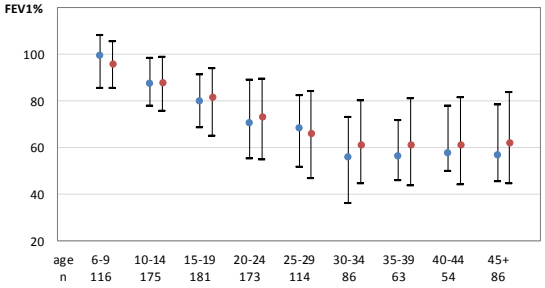
Quartiles of FEV$_1$%: Rep of Macedonia



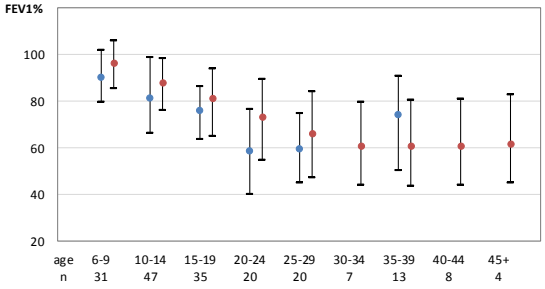
Quartiles of FEV$_1$%: Rep of Moldova



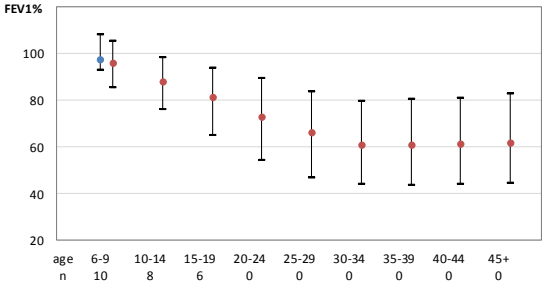
Quartiles of FEV$_1$%: The Netherlands



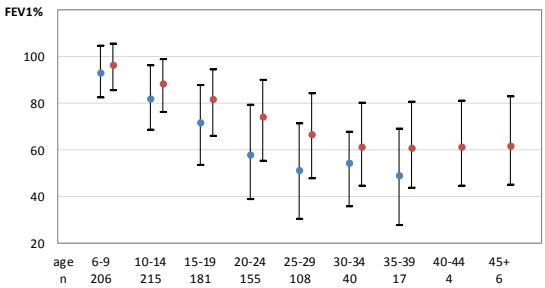
Quartiles of FEV$_1$%: Portugal



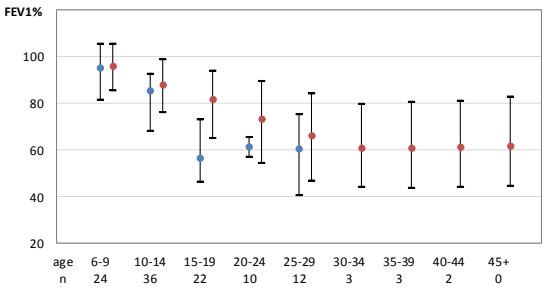
Quartiles of FEV$_1$%: Romania



Quartiles of FEV$_1$%: Russian Federation

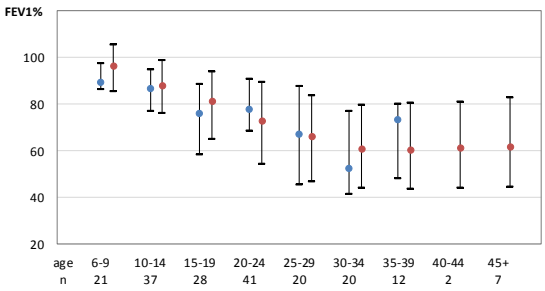


Quartiles of FEV$_1$%: Serbia

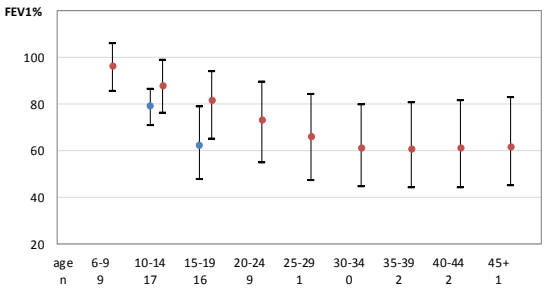


[figure 4.4 continued]

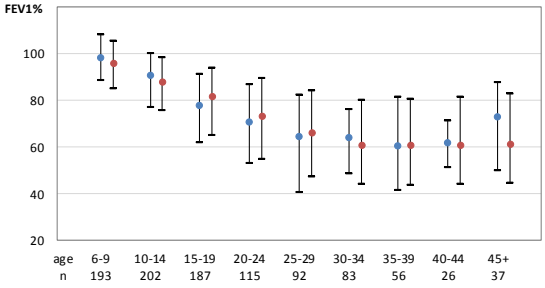
Quartiles of FEV_1%: Slovak Republic



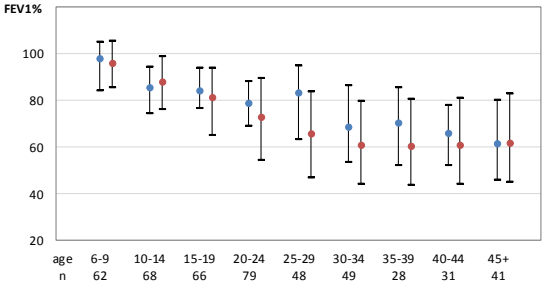
Quartiles of FEV_1%: Slovenia



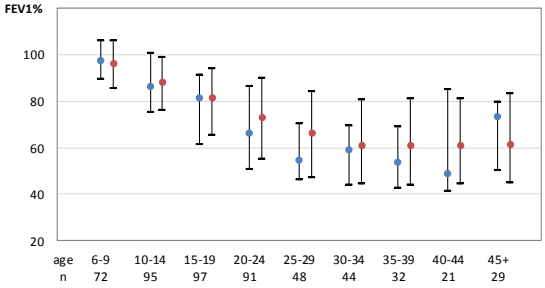
Quartiles of FEV_1%: Spain



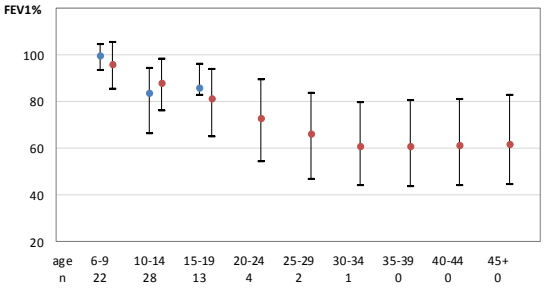
Quartiles of FEV_1%: Sweden[1]



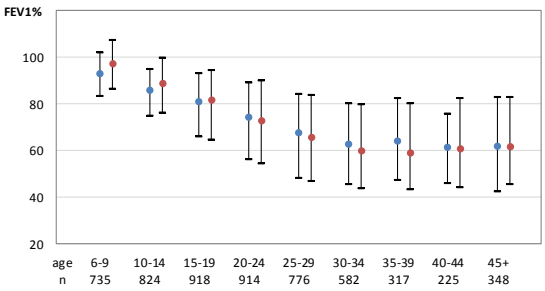
Quartles of FEV_1%: Switzerland



Quartiles of FEV_1%: Ukraine



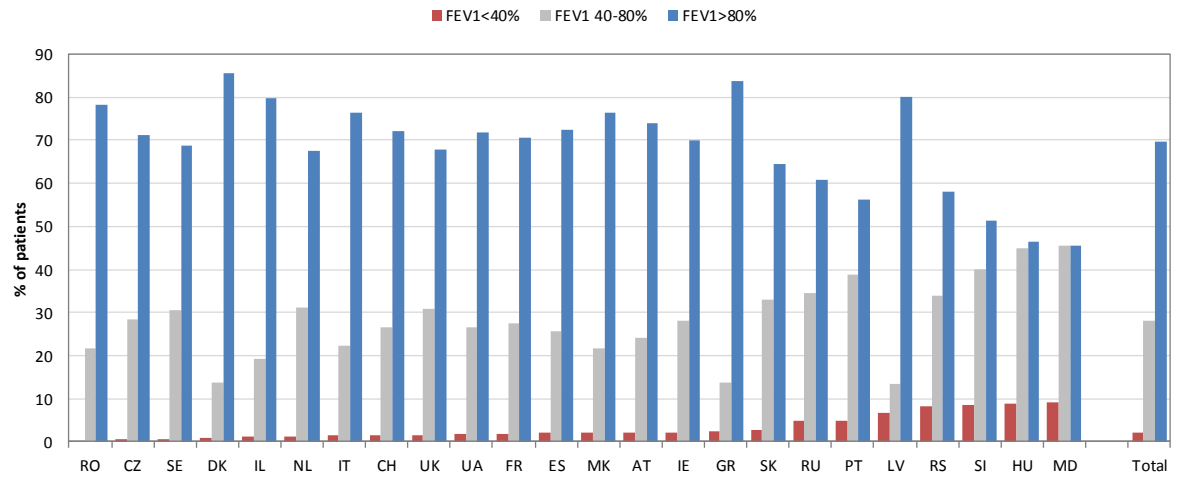
Quartiles of FEV_1%: United Kingdom[2]



[1] Sweden reports FEV_1 collected at the time of the annual review.

[2] United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.

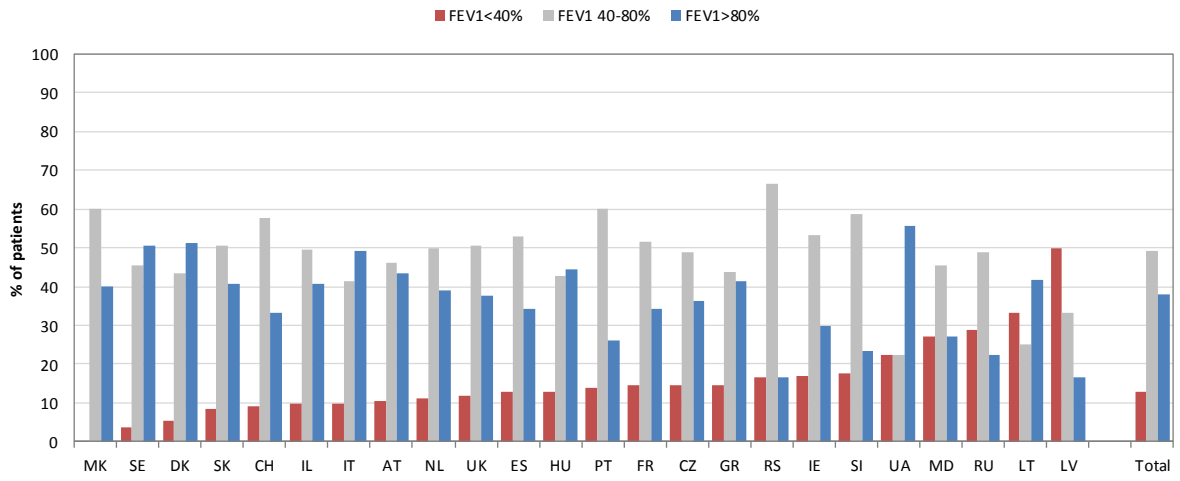
Figure 4.5 FEV_1% of predicted according to severity group and age group, by country and overall. Patients aged 6-17 years who have never had a lung transplant.



Note: Not every country reported the best FEV_1 value of the year:
Sweden reports FEV_1 collected at the time of the annual review;
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: For Lithuania coverage is 0% for children.

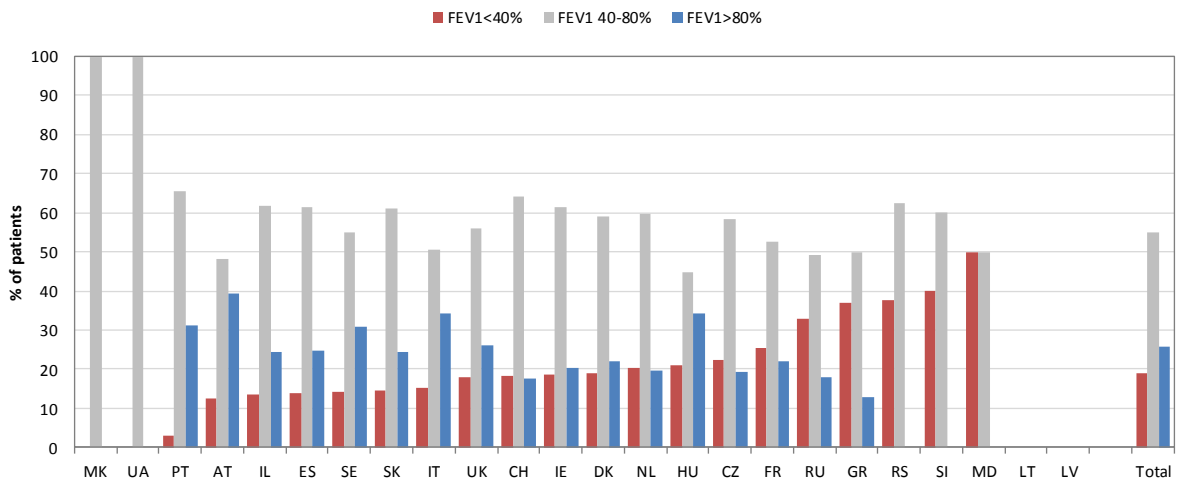
Figures 4.5, 4.6 and 4.7 show the FEV_1% by severity group, by country and overall. Patients with a FEV_1% above 80% are generally considered to have mild lung disease, patients with FEV_1% between 80% and 40% moderate lung disease, and patients with FEV_1 below 40% severe lung disease. However, since a 10 year old child with a lung function of 50% has considerably worse lung disease than a 50 year old patient with the same FEV_1%, and the age distribution is not the same in all countries, we have chosen to present children (fig 4.5) and adults (fig 4.6 and 4.7) separately.

Figure 4.6 FEV_1% of predicted according to severity group and age group, by country and overall. Patients aged 18-29 years who have never had a lung transplant.



Note: Not every country reported the best FEV_1 value of the year:
Sweden reports FEV_1 collected at the time of the annual review;
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has only one patient and is excluded from the graph.

Figure 4.7 FEV_1% of predicted according to severity group and age group, by country and overall. Patients aged 30 years or older who have never had a lung transplant.



Note: Not every country reported the best FEV_1 value of the year:
Sweden reports FEV_1 collected at the time of the annual review;
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has only one patient and is excluded from the graph.

5. Microbiology

We collect data on three chronic infections – *Pseudomonas aeruginosa*, *Burkholderia cepacia complex species* and *Staphyloccocus aureus* – as well as the occurrence of non-tuberculous mycobacteria (NTM) and *Stenotrophomonas maltophilia*.

In the microbiology category discrepancies exist between the ECFSPR definitions and those of the national registries. The ECFSPR definition of chronic infection (see Appendix 2, page 122) is:

Patient should be defined as chronically infected if he/she fulfils the criteria now or has done in recent years and the physician has no reason to think the status has changed:

a. modified Leeds criteria, chronic infection: >50% of the sputum samples positive, collected during the last 12 months. At least 4 sputum samples during that period;

b. and/or significantly raised bacteria-specific antibodies according to local laboratories.

When minor differences exist the alternative definition is in a footnote; when differences are major, or if the variable is not collected at all, the variable has been set to missing for that country.

Table 5.1 Prevalence of chronic bacterial infection in all patients seen in 2014, by country.

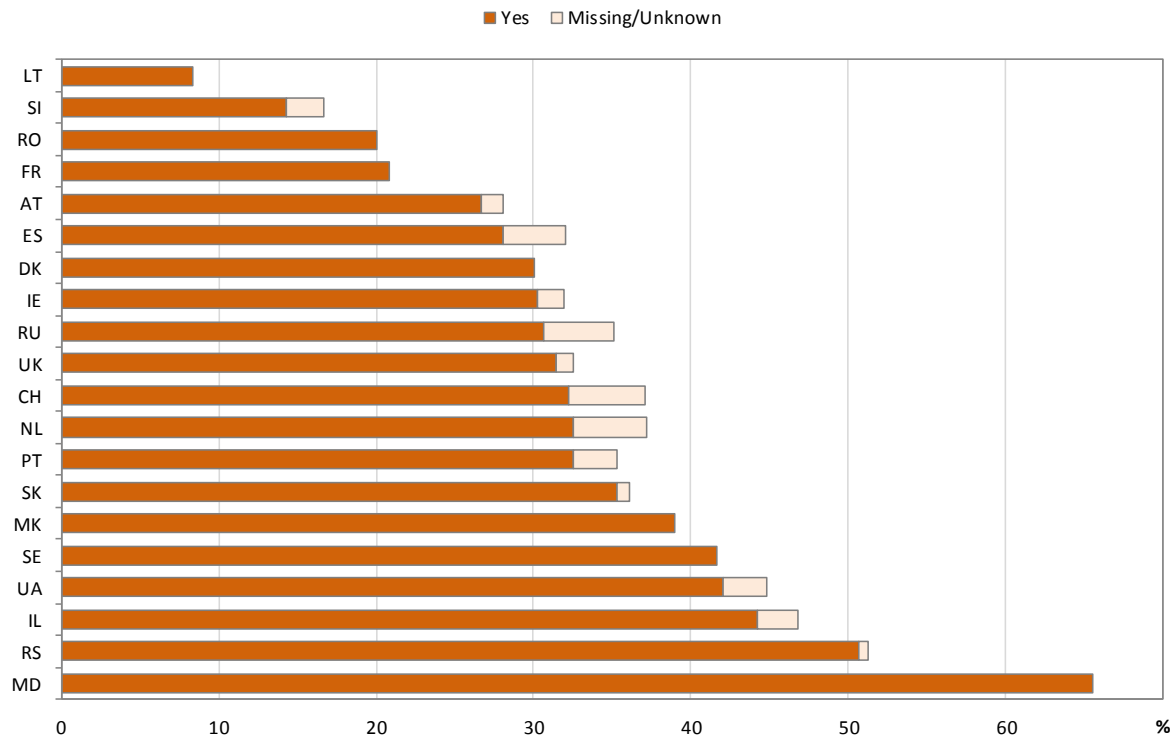
Country	Chronic *Pseudomonas aeruginosa* number (%)			Chronic *Burkholderia cepacia complex species* number (%)			Chronic *Staphylococcus aureus* number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	10 (1.46)	494 (71.91)	183 (26.64)	9 (1.31)	653 (95.05)	25 (3.64)	13 (1.89)	301 (43.81)	373 (54.29)
Czech Republic	154 (25.71)	320 ((53.42)	125 (20.87)	94 (15.69)	442 (73.79)	63 (10.52)	153 (25.54)	215 (35.89)	231 (38.56)
Denmark	0 (0)	321 (69.93)	138 (30.07)	0 (0)	431 (93.90)	28 (6.10)	459 (100)	-	-
France	0 (0)	5040 (79.13)	1329 (20.87)	0 (0)	6315 (99.15)	54 (0.85)	6369 (100)	-	-
Greece	134 (26.43)	174 (34.32)	199 (39.25)	135 (26.63)	372 (73.37)	0 (0)	135 (26.63)	267 (52.66)	105 (20.71)
Hungary	72 (12.93)	314 (56.37)	171 (30.70)	97 (17.41)	451 (80.97)	9 (1.62)	74 (13.29)	265 (47.58)	218 (39.14)
Ireland[1]	16 (1.70)	641 (68.05)	285 (30.25)	14 (1.49)	906 (96.18)	22 (2.34)	14 (1.49)	550 (58.39)	378 (40.13)
Israel	14 (2.56)	291 (53.20)	242 (44.24)	15 (2.74)	529 (96.71)	3 (0.55)	14 (2.56)	332 (60.69)	201 (36.75)
Italy	765 (15.36)	2588 (51.97)	1627 (32.67)	771 (15.48)	4079 (81.91)	130 (2.61)	766 (15.38)	1946 (39.08)	2268 (45.54)
Latvia	4 (10.53)	16 (42.11)	18 (47.37)	6 (15.79)	30 (78.95)	2 (5.26)	4 (10.53)	8 (21.05)	26 (68.42)
Lithuania	0 (0)	11 (91.67)	1 (8.33)	0 (0)	10 (83.33)	2 (16.67)	0 (0)	3 (25.00)	9 (75.00)
Rep of Macedonia	0 (0)	61 (61.00)	39 (39.00)	0 (0)	99 (99.00)	1 (1.00)	0 (0)	74 (74.00)	26 (26.00)
Rep of Moldova	0 (0)	21 (34.43)	40 (65.57)	0 (0)	60 (98.36)	1 (1.64)	1 (1.64)	22 (36.07)	38 (62.30)
The Netherlands	64 (4.64)	866 (62.84)	448 (32.51)	61 (4.43)	1296 (94.05)	21 (1.52)	64 (4.64)	710 (51.52)	604 (43.83)
Portugal	7 (2.71)	167 (64.73)	84 (32.56)	7 (2.71)	234 (90.70)	17 (6.59)	8 (3.10)	142 (55.04)	108 (41.86)
Romania	0 (0)	32 (80.00)	8 (20.00)	0 (0)	40 (100)	0 (0)	0 (0)	31 (77.5)	9 (22.5)
Russian Federation	95 (4.48)	1377 (64.92)	649 (30.60)	95 (4.48)	1880 (88.64)	146 (6.88)	94 (4.43)	922 (43.47)	1105 (52.1)
Serbia	1 (0.65)	75 (48.70)	78 (50.65)	1 (0.65)	134 (87.01)	19 (12.34)	1 (0.65)	56 (36.36)	97 (62.99)
Slovak Republic	2 (0.83)	154 (63.90)	85 (35.27)	1 (0.41)	227 (94.19)	13 (5.39)	1 (0.41)	126 (52.28)	114 (47.3)
Slovenia	2 (2.38)	70 (83.33)	12 (14.29)	2 (2.38)	81 (96.43)	1 (1.19)	2 (2.38)	59 (70.24)	23 (27.38)
Spain	60 (4.05)	1006 (67.93)	415 (28.02)	64 (4.32)	1348 (91.02)	69 (4.66)	60 (4.05)	814 (54.96)	607 (40.99)
Sweden	0 (0)	365 (58.31)	261 (41.69)	0 (0)	608 (97.12)	18 (2.88)	626 (100)	-	-
Switzerland	36 (4.89)	463 (62.91)	237 (32.20)	31 (4.21)	689 (93.61)	16 (2.17)	40 (5.43)	311 (42.26)	385 (52.31)
Ukraine	3 (2.80)	59 (55.14)	45 (42.06)	3 (2.80)	104 (97.20)	0 (0)	5 (4.67)	37 (34.58)	65 (60.75)
United Kingdom[2]	107 (1.13)	6359 (67.43)	2964 (31.43)	0 (0)	9101 (96.51)	329 (3.49)	123 (1.30)	7847 (83.21)	1460 (15.48)

[1] Ireland: chronicity is defined as: at least 4 samples recorded in the preceding 12 months and 50% or more of these samples being positive in the preceding 12 months.

[2] United Kingdom: chronicity for *Pseudomonas aeruginosa* and *Staphylococcus aureus* is defined as: 3 or more positive isolates during the last 12 months. Information on *Burkholderia* is collected as: *Burkholderia* grown at annual review, not necessarily chronic.

Table 5.1 shows, separately by country, the frequency of chronic *Pseudomonas aeruginosa*, chronic *Burkholderia cepacia complex species* and chronic *Staphylococcus aureus*. The number of missing values is also included. The identification rate of *Burkholderia cepacia complex species* in particular may also be influenced by differences in culture techniques employed.

Figure 5.1 Prevalence of chronic Pseudomonas aeruginosa infection in all patients seen in 2014, by country.

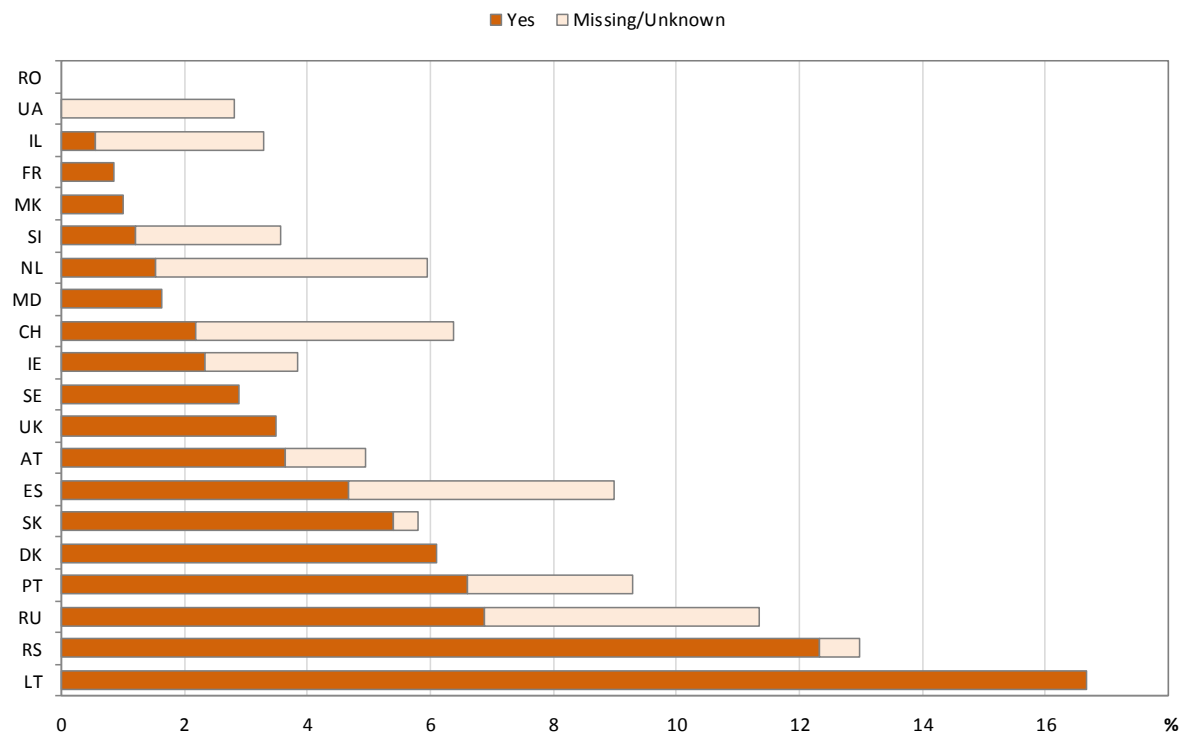


Note: We excluded from the graph the countries for which the information on *Pseudomonas aeruginosa* was missing for more than 10% of the patients.

Note: Ireland: for chronic *Pseudomonas aeruginosa* the definition is: at least 4 samples recorded in the preceding 12 months and 50% or more of these samples being positive in the preceding 12 months.
United Kingdom: for chronic *Pseudomonas aeruginosa* the definition is: 3 or more positive isolates during the last 12 months.

The horizontal bars represent the percentage of patients with chronic *Pseudomonas aeruginosa* infection (in dark orange) and the percentage of patients where information on *Pseudomonas aeruginosa* infection was missing (in light orange). This is a frequent infection but prevalence varies considerably between countries.

Figure 5.2 Prevalence of chronic Burkholderia cepacia complex species infection in all patients seen in 2014, by country.

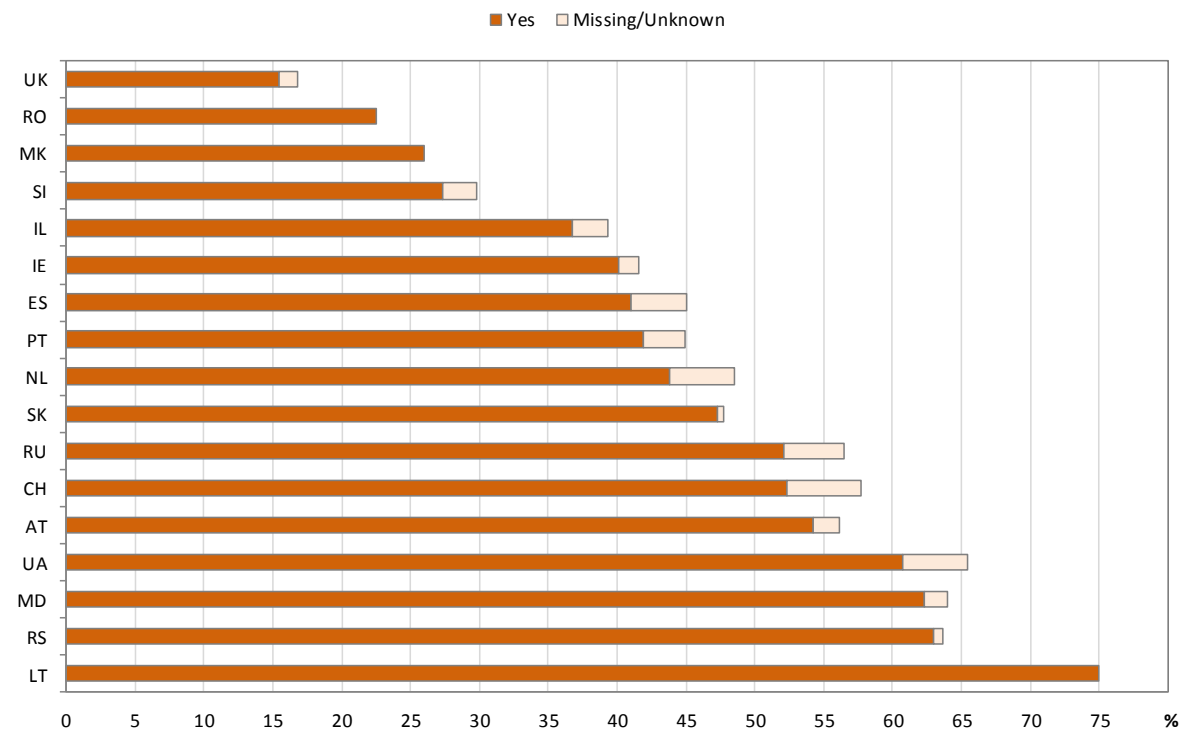


Note: We excluded from the graph the countries for which the information on *Burkholderia cepacia complex species* was missing for more than 10% of the patients.

Note: Ireland: for chronic *Burkholderia cepacia complex species* the definition is: at least 4 samples recorded in the preceding 12 months and 50% or more of these samples being positive in the preceding 12 months.
United Kingdom: information on *Burkholderia* is collected as follows: *Burkholderia* grown at annual review, not necessarily chronic.

The horizontal bars represent the percentage of patients with chronic *Burkholderia* infection (in dark orange) and the percentage of patients where information on *Burkholderia* infection was missing (in light orange). This infection is much less frequent than *Pseudomonas aeruginosa* (note the different scale on the horizontal axis), and there is also some variation.

Figure 5.3 Prevalence of chronic Staphylococcus aureus infection in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on *Staphylococcus aureus* was missing for more than 10% of the patients.

Note: Ireland: for chronic *Staphylococcus aureus* the definition is: at least 4 samples recorded in the preceding 12 months and 50% or more of these samples being positive in the preceding 12 months.
United Kingdom: for chronic *Staphylococcus aureus* the definition is: 3 or more positive isolates during the last 12 months.

The horizontal bars represent the percentage of patients with chronic *Staphylococcus aureus* infection (in dark orange) and the percentage of patients where information on *Staphylococcus aureus* was missing (in light orange). This infection is as frequent as chronic *Pseudomonas aeruginosa* infection and a similar degree of variation between the countries can be observed.

Table 5.2 Prevalence of chronic bacterial infection in children seen in 2014, by country.

Country	Chronic *Pseudomonas aeruginosa* number (%)			Chronic *Burkholderia cepacia complex species* number (%)			Chronic *Staphylococcus aureus* number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	6 (1.61)	334 (89.78)	32 (8.60)	4 (1.08)	365 (98.12)	3 (0.81)	8 (2.15)	170 (45.70)	194 (52.15)
Czech Republic	87 (26.44)	206 (62.61)	36 (10.94)	44 (13.37)	280 (85.11)	5 (1.52)	90 (27.36)	95 (28.88)	144 (43.77)
Denmark	0 (0)	171 (91.94)	15 (8.06)	0 (0)	185 (99.46)	1 (0.54)	186 (100)	-	-
France	0 (0)	2818 (93.10)	209 (6.90)	0 (0)	3017 (99.67)	10 (0.33)	3027 (100)	-	-
Greece	73 (29.08)	128 (51.00)	50 (19.92)	73 (29.08)	178 (70.92)	0 (0)	74 (29.48)	145 (57.77)	32 (12.75)
Hungary	10 (3.26)	214 (69.71)	83 (27.04)	32 (10.42)	273 (88.93)	2 (0.65)	11 (3.58)	173 (56.35)	123 (40.07)
Ireland[1]	3 (0.57)	445 (84.60)	78 (14.83)	3 (0.57)	514 (97.72)	9 (1.71)	3 (0.57)	264 (50.19)	259 (49.24)
Israel	4 (1.69)	174 (73.42)	59 (24.89)	4 (1.69)	232 (97.89)	1 (0.42)	4 (1.69)	117 (49.37)	116 (48.95)
Italy	463 (20.90)	1445 (65.24)	307 (13.86)	465 (20.99)	1743 (78.69)	7 (0.32)	461 (20.81)	773 (34.90)	981 (44.29)
Latvia	4 (14.81)	14 (51.85)	9 (33.33)	4 (14.81)	21 (77.78)	2 (7.41)	4 (14.81)	2 (7.41)	21 (77.78)
Rep of Macedonia	0 (0)	49 (67.12)	24 (32.88)	0 (0)	73 (100)	0 (0)	0 (0)	56 (76.71)	17 (23.29)
Rep of Moldova	0 (0)	16 (34.04)	31 (65.96)	0 (0)	46 (97.87)	1 (2.13)	0 (0)	17 (36.17)	30 (63.83)
The Netherlands	4 (0.67)	507 (84.64)	88 (14.69)	2 (0.33)	591 (98.66)	6 (1.00)	4 (0.67)	316 (52.75)	279 (46.58)
Portugal	2 (1.29)	112 (72.26)	41 (26.45)	2 (1.29)	142 (91.61)	11 (7.10)	3 (1.94)	91 (58.71)	61 (39.35)
Romania	0 (0)	31 (79.49)	8 (20.51)	0 (0)	39 (100)	0 (0)	0 (0)	30 (76.92)	9 (23.08)
Russian Federation	48 (3.21)	1102 (73.71)	345 (23.08)	42 (2.81)	1389 (92.91)	64 (4.28)	42 (2.81)	637 (42.61)	816 (54.58)
Serbia	0 (0)	66 (61.11)	42 (38.89)	0 (0)	96 (88.89)	12 (11.11)	0 (0)	37 (34.26)	71 (65.74)
Slovak Republic	2 (1.67)	89 (74.17)	29 (24.17)	1 (0.83)	117 (97.50)	2 (1.67)	1 (0.83)	60 (50.00)	59 (49.17)
Slovenia	0 (0)	52 (89.66)	6 (10.34)	0 (0)	57 (98.28)	1 (1.72)	0 (0)	50 (86.21)	8 (13.79)
Spain	12 (1.40)	729 (84.77)	119 (13.84)	15 (1.74)	819 (95.23)	26 (3.02)	12 (1.40)	494 (57.44)	354 (41.16)
Sweden	0 (0)	194 (82.91)	40 (17.09)	0 (0)	231 (98.72)	3 (1.28)	234 (100)	-	-
Switzerland	12 (3.14)	321 (84.03)	49 (12.83)	8 (2.09)	372 (97.38)	2 (0.52)	15 (3.93)	156 (40.84)	211 (55.24)
Ukraine	3 (3.19)	57 (60.64)	34 (36.17)	3 (3.19)	91 (96.81)	0 (0)	5 (5.32)	34 (36.17)	55 (58.51)
United Kingdom[2]	38 (0.90)	3788 (89.78)	393 (9.32)	0 (0)	4155 (98.48)	64 (1.52)	50 (1.19)	3815 (90.42)	354 (8.39)

[1] Ireland: chronicity is defined as: at least 4 samples recorded in the preceding 12 months and 50% or more of these samples being positive in the preceding 12 months.

[2] United Kingdom: chronicity for *Pseudomonas aeruginosa* and *Staphylococcus aureus* is defined as: 3 or more positive isolates during the last 12 months. Information on *Burkholderia* is collected as follows: *Burkholderia* grown at annual review, not necessarily chronic.

Note: for Lithuania coverage is 0% for children.

Table 5.2 presents, separately by country, the frequency of chronic *Pseudomonas aeruginosa*, chronic *Burkholderia cepacia complex species* and chronic *Staphylococcus aureus* in children. The number of missing values is also included. The identification rate of *Burkholderia cepacia complex species* in particular, may also be influenced by differences in culture techniques employed.

Table 5.3 Prevalence of chronic bacterial infection in adults seen in 2014, by country.

Country	Chronic *Pseudomonas aeruginosa* number (%)			Chronic *Burkholderia cepacia complex species* number (%)			Chronic *Staphylococcus aureus* number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	4 (1.27)	160 (50.79)	151 (47.94)	5 (1.59)	288 (91.43)	22 (6.98)	5 (1.59)	131 (41.59)	179 (56.83)
Czech Republic	67 (24.81)	114 (42.22)	89 (32.96)	50 (18.52)	162 (60.00)	58 (21.48)	63 (23.33)	120 (44.44)	87 (32.22)
Denmark	0 (0)	150 (54.95)	123 (45.05)	0 (0)	246 (90.11)	27 (9.89)	273 (100)	-	-
France	0 (0)	2222 (66.49)	1120 (33.51)	0 (0)	3298 (98.68)	44 (1.32)	3342 (100)	-	-
Greece	61 (23.83)	46 (17.97)	149 (58.20)	62 (24.22)	194 (75.78)	0 (0)	61 (23.83)	122 (47.66)	73 (28.52)
Hungary	62 (24.90)	99 (39.76)	88 (35.34)	65 (26.10)	177 (71.08)	7 (2.81)	63 (25.30)	91 (36.55)	95 (38.15)
Ireland[1]	13 (3.13)	196 (47.12)	207 (49.76)	11 (2.64)	392 (94.23)	13 (3.13)	11 (2.64)	286 (68.75)	119 (28.61)
Israel	10 (3.23)	117 (37.74)	183 (59.03)	11 (3.55)	297 (95.81)	2 (0.65)	10 (3.23)	215 (69.35)	85 (27.42)
Italy	302 (10.92)	1143 (41.34)	1320 (47.74)	306 (11.07)	2336 (84.48)	123 (4.45)	305 (11.03)	1173 (42.42)	1287 (46.55)
Latvia	0 (0)	2 (18.18)	9 (81.82)	2 (18.18)	9 (81.82)	0 (0)	0 (0)	6 (54.55)	5 (45.45)
Lithuania	0 (0)	11 (91.67)	1 (8.33)	0 (0)	10 (83.33)	2 (16.67)	0 (0)	3 (25.00)	9 (75.00)
Rep of Macedonia	0 (0)	12 (44.44)	15 (55.56)	0 (0)	26 (96.3)0	1 (3.70)	0 (0)	18 (66.67)	9 (33.33)
Rep of Moldova	0 (0)	5 (35.71)	9 (64.29)	0 (0)	14 (100)	0 (0)	1 (7.14)	5 (35.71)	8 (57.14)
The Netherlands	60 (7.70)	359 (46.08)	360 (46.21)	59 (7.57)	705 (90.50)	15 (1.93)	60 (7.70)	394 (50.58)	325 (41.72)
Portugal	5 (4.85)	55 (53.40)	43 (41.75)	5 (4.85)	92 (89.32	6 (5.83)	5 (4.85)	51 (49.51)	47 (45.63)
Russian Federation	47 (7.51)	275 (43.93)	304 (48.56)	53 (8.47)	491 (78.43)	82 (13.10)	52 (8.31)	285 (45.53)	289 (46.17)
Serbia	1 (2.17)	9 (19.57)	36 (78.26)	1 (2.17)	38 (82.61)	7 (15.22)	1 (2.17)	19 (41.30)	26 (56.52)
Slovak Republic	0 (0)	65 (53.72)	56 (46.28)	0 (0)	110 (90.91)	11 (9.09)	0 (0)	66 (54.55)	55 (45.45)
Slovenia	2 (7.69)	18 (69.23)	6 (23.08)	2 (7.69)	24 (92.31)	0 (0)	2 (7.69)	9 (34.62)	15 (57.69)
Spain	48 (7.73)	277 (44.61)	296 (47.67)	49 (7.89)	529 (85.19)	43 (6.92)	48 (7.73)	320 (51.53)	253 (40.74)
Sweden	0 (0)	171 (43.62)	221 (56.38)	0 (0)	377 (96.17)	15 (3.83)	392 (100)	-	-
Switzerland	24 (6.78)	142 (40.11)	188 (53.11)	23 (6.50)	317 (89.55)	14 (3.95)	25 (7.06)	155 (43.79)	174 (49.15)
Ukraine	0 (0)	2 (15.38)	11 (84.62)	0 (0)	13 (100)	0 (0)	0 (0)	3 (23.08)	10 (76.92)
United Kingdom[2]	69 (1.32)	2571 (49.34)	2571 (49.34)	0 (0)	4946 (94.91)	265 (5.09)	73 (1.40)	4032 (77.37)	1106 (21.22)

[1] Ireland: chronicity is defined as: at least 4 samples recorded in the preceding 12 months and 50% or more of these samples being positive in the preceding 12 months.

[2] United Kingdom: chronicity for *Pseudomonas aeruginosa* and *Staphylococcus aureus* is defined as: 3 or more positive isolates during the last 12 months. Information on *Burkholderia* is collected as follows: *Burkholderia* grown at annual review, not necessarily chronic.

Note: Romania has only one adult patient and is excluded from the table.

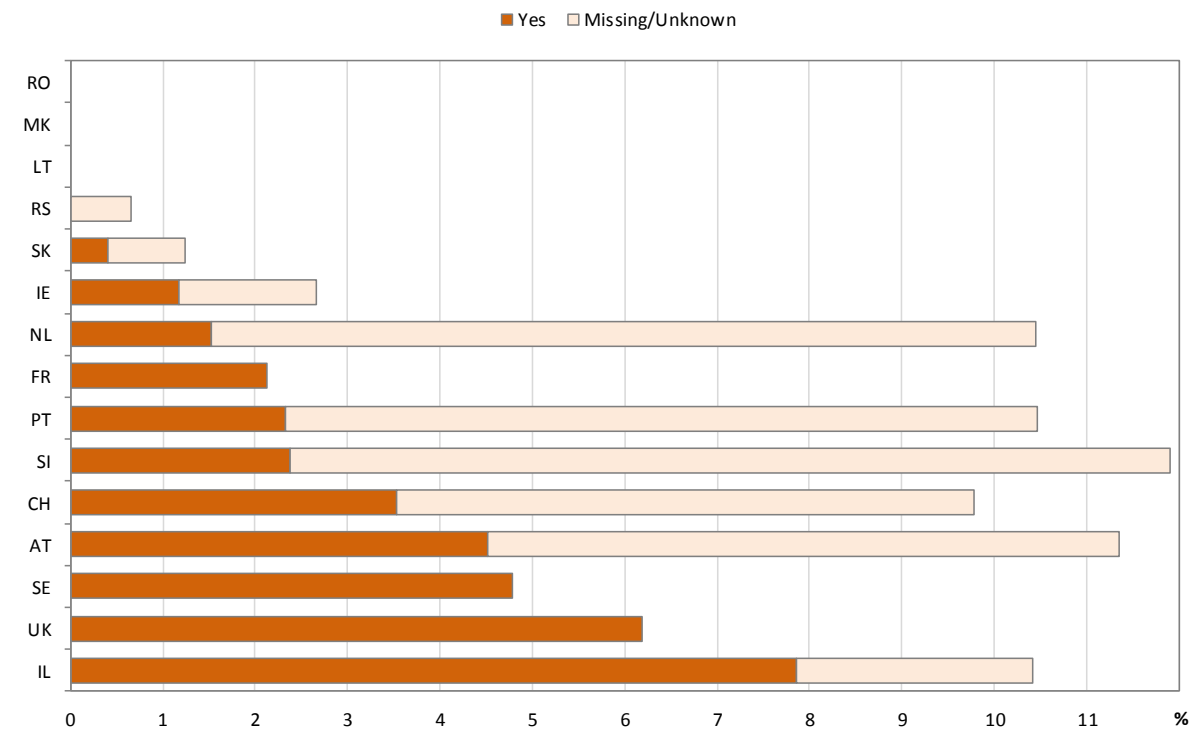
Table 5.3 shows, separately by country, the frequency of chronic *Pseudomonas aeruginosa*, chronic *Burkholderia cepacia complex species* and chronic *Staphylococcus aureus in adults*. The number of missing values is also included. The identification rate of *Burkholderia cepacia complex species* in particular may also be influenced by differences in culture techniques employed.

Table 5.4 Prevalence of non-tuberculous mycobacteria and Stenotrophomonas maltophilia infection in all patients seen in 2014, by country.

Country	Non-tuberculous mycobacteria (NTM) infection this year number (%)			*Stenotrophomonas maltophilia* infection this year number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	47 (6.84)	609 (88.65)	31 (4.51)	10 (1.46)	614 (89.37)	63 (9.17)
Czech Republic	338 (56.43)	242 (40.40)	19 (3.17)	91 (15.19)	437 (72.95)	71 (11.85)
Denmark	459 (100)	-	-	459 (100)	-	-
France	0 (0)	6234 (97.88)	135 (2.12)	0 (0)	5724 (89.87)	645 (10.13)
Greece	360 (71.01)	144 (28.40)	3 (0.59)	136 (26.82)	342 (67.46)	29 (5.72)
Hungary	130 (23.34)	422 (75.76)	5 (0.90)	83 (14.90)	461 (82.76)	13 (2.33)
Ireland	14 (1.49)	917 (97.35)	11 (1.17)	14 (1.49)	842 (89.38)	86 (9.13)
Israel	14 (2.56)	490 (89.58)	43 (7.86)	13 (2.38)	502 (91.77)	32 (5.85)
Italy	771 (15.48)	4179 (83.92)	30 (0.60)	771 (15.48)	3976 (79.84)	233 (4.68)
Latvia	4 (10.53)	34 (89.47)	0 (0)	4 (10.53)	32 (84.21)	2 (5.26)
Lithuania	0 (0)	12 (100)	0 (0)	0 (0)	11 (91.67)	1 (8.33)
Rep of Macedonia	0 (0)	100 (100)	0 (0)	0 (0)	95 (95.00)	5 (5.00)
Rep of Moldova	61 (100)	-	-	0 (0)	58 (95.08)	3 (4.92)
The Netherlands	123 (8.93)	1234 (89.55)	21 (1.52)	64 (4.64)	1142 (82.87)	172 (12.48)
Portugal	21 (8.14)	231 (89.53)	6 (2.33)	7 (2.71)	224 (86.82)	27 (10.47)
Romania	0 (0)	40 (100)	0 (0)	0 (0)	40 (100)	0 (0)
Russian Federation	755 (35.6)	1356 (63.93)	10 (0.47)	100 (4.71)	1955 (92.17)	66 (3.11)
Serbia	1 (0.65)	153 (99.35)	0 (0)	1 (0.65)	143 (92.86)	10 (6.49)
Slovak Republic	2 (0.83)	238 (98.76)	1 (0.41)	3 (1.24)	224 (92.95)	14 (5.81)
Slovenia	8 (9.52)	74 (88.10)	2 (2.38)	13 (15.48)	66 (78.57)	5 (5.95)
Spain	292 (19.72)	1144 (77.25)	45 (3.04)	64 (4.32)	1307 (88.25)	110 (7.43)
Sweden	0 (0)	596 (95.21)	30 (4.79)	0 (0)	573 (91.53)	53 (8.47)
Switzerland	46 (6.25)	664 (90.22)	26 (3.53)	32 (4.35)	624 (84.78)	80 (10.87)
Ukraine	107 (100)	-	-	2 (1.87)	102 (95.33)	3 (2.80)
United Kingdom	0 (0)	8847 (93.82)	583 (6.18)	0 (0)	8837 (93.71)	593 (6.29)

Table 5.4 shows the frequency of two other infections, non-tuberculous mycobacteria (NTM) and *Stenotrophomonas maltophilia.* Both these infections seem to be relatively rare, in line with the frequencies of *Burkholderia* infection. The identification rate of these bacteria may also be influenced by differences in culture techniques employed.

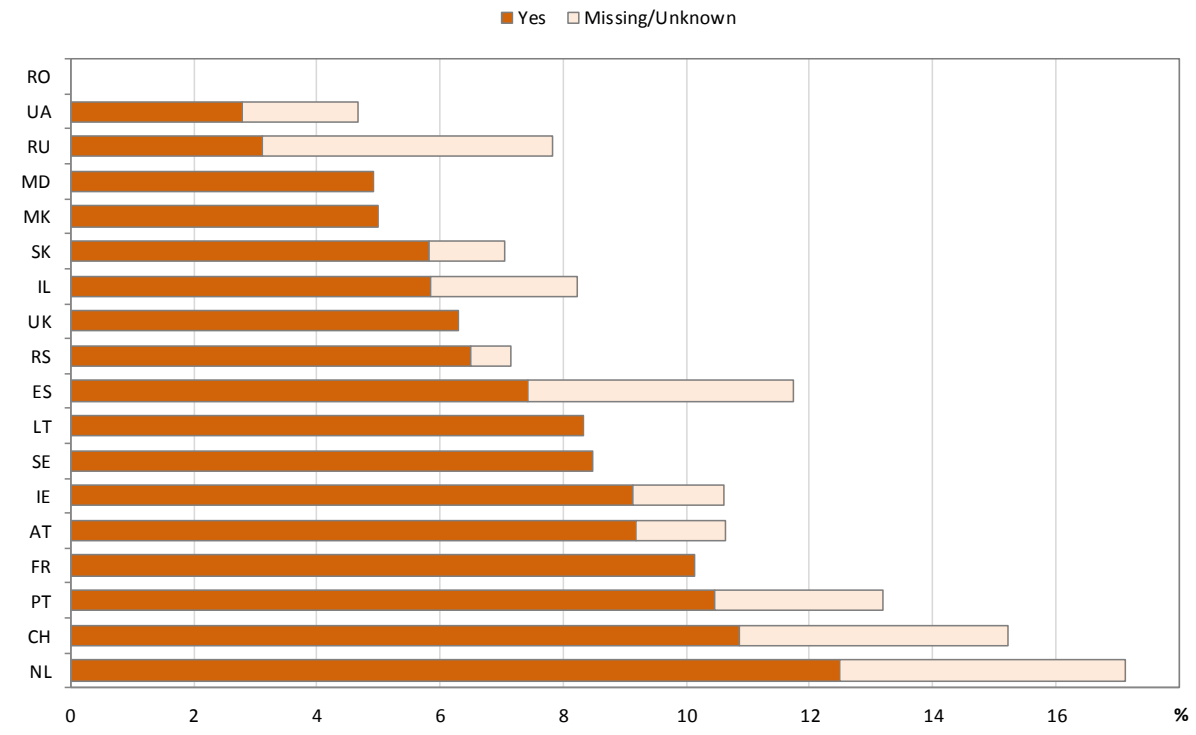
Figure 5.4 Prevalence of non-tuberculous mycobacteria in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on non-tuberculous mycobacteria was missing for more than 10% of the patients.

The horizontal bars represent the percentage of patients with non-tuberculous mycobacteria infection (in dark orange) and the percentage of patients where information on non-tuberculous mycobacteria infection was missing (in light orange). Generally, infections from these bacteria are not very frequent in any country.

Figure 5.5 Prevalence of Stenotrophomonas maltophilia infection in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on *Stenotrophomonas maltophilia* was missing for more than 10% of the patients.

The horizontal bars represent the percentage of patients with *Stenotrophomonas maltophilia* infection (in dark orange) and the percentage of patients where information on *Stenotrophomonas maltophilia* was missing (light orange). The frequency varies considerably between countries.

Table 5.5 Prevalence of non-tuberculous mycobacteria and Stenotrophomonas maltophilia infection in children seen in 2014, by country.

Country	Non-tuberculous mycobacteria (NTM) infection this year number (%)			*Stenotrophomonas maltophilia* infection this year number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	28 (7.53)	334 (89.78)	10 (2.69)	3 (0.81)	340 (91.4)	29 (7.80)
Czech Republic	269 (81.76)	59 (17.93)	1 (0.30)	41 (12.46)	244 (74.16)	44 (13.37)
Denmark	186 (100)	-	-	186 (100)	-	-
France	0 (0)	2989 (98.74)	38 (1.26)	0 (0)	2688 (88.80)	339 (11.20)
Greece	179 (71.31)	72 (28.69)	0 (0)	73 (29.08)	170 (67.73)	8 (3.19)
Hungary	68 (22.15)	239 (77.85)	0 (0)	21 (6.84)	280 (91.21)	6 (1.95)
Ireland	3 (0.57)	517 (98.29)	6 (1.14)	3 (0.57)	465 (88.4)	58 (11.03)
Israel	4 (1.69)	219 (92.41)	14 (5.91)	4 (1.69)	216 (91.14)	17 (7.17)
Italy	465 (20.99)	1743 (78.69)	7 (0.32)	465 (20.99)	1645 (74.27)	105 (4.74)
Latvia	4 (14.81)	23 (85.19)	0 (0)	4 (14.81)	22 (81.48)	1 (3.70)
Rep of Macedonia	0 (0)	73 (100)	0 (0)	0 (0)	68 (93.15)	5 (6.85)
Rep of Moldova	47 (100)	-	-	0 (0)	45 (95.74)	2 (4.26)
The Netherlands	26 (4.34)	563 (93.99)	10 (1.67)	3 (0.50)	516 (86.14)	80 (13.36)
Portugal	15 (9.68)	139 (89.68)	1 (0.65)	2 (1.29)	134 (86.45)	19 (12.26)
Romania	0 (0)	39 (100)	0 (0)	0 (0)	39 (100)	0 (0)
Russian Federation	525 (35.12)	968 (64.75)	2 (0.13)	42 (2.81)	1409 (94.25)	44 (2.94)
Serbia	0 (0)	108 (100)	0 (0)	0 (0)	98 (90.74)	10 (9.26)
Slovak Republic	1 (0.83)	119 (99.17)	0 (0)	1 (0.83)	116 (96.67)	3 (2.50)
Slovenia	0 (0)	57 (98.28)	1 (1.72)	0 (0)	56 (96.55)	2 (3.45)
Spain	161 (18.72)	677 (78.72)	22 (2.56)	15 (1.74)	778 (90.47)	67 (7.79)
Sweden	0 (0)	226 (96.58)	8 (3.42)	0 (0)	217 (92.74)	17 (7.26)
Switzerland	13 (3.40)	366 (95.81)	3 (0.79)	8 (2.09)	340 (89.01)	34 (8.90)
Ukraine	94 (100)	-	-	2 (2.13)	89 (94.68)	3 (3.19)
United Kingdom	0 (0)	4073 (96.54)	146 (3.46)	0 (0)	3962 (93.91)	257 (6.09)

Note: For Lithuania coverage is 0% for children.

Table 5.6 Prevalence of non-tuberculous mycobacteria and Stenotrophomonas maltophilia infection in adults seen in 2014, by country.

Country	Non-tuberculous mycobacteria (NTM) infection this year number (%)			*Stenotrophomonas maltophilia* infection this year number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	19 (6.03)	275 (87.30)	21 (6.67)	7 (2.22)	274 (86.98)	34 (10.79)
Czech Republic	69 (25.56)	183 (67.78)	18 (6.67)	50 (18.52)	193 (71.48)	27 (10.00)
Denmark	273 (100)	-	-	273 (100)	-	-
France	0 (0)	3245 (97.10)	97 (2.90)	0 (0)	3036 (90.84)	306 (9.16)
Greece	181 (70.70)	72 (28.13)	3 (1.17)	63 (24.61)	172 (67.19)	21 (8.20)
Hungary	62 (24.90)	182 (73.09)	5 (2.01)	62 (24.90)	180 (72.29)	7 (2.81)
Ireland	11 (2.64)	400 (96.15)	5 (1.20)	11 (2.64)	377 (90.63)	28 (6.73)
Israel	10 (3.23)	271 (87.42)	29 (9.35)	9 (2.90)	286 (92.26)	15 (4.84)
Italy	306 (11.07)	2436 (88.10)	23 (0.83)	306 (11.07)	2331 (84.30)	128 (4.63)
Latvia	0 (0)	11 (100)	0 (0)	0 (0)	10 (90.91)	1 (9.09)
Lithuania	0 (0)	12 (100)	0 (0)	0 (0)	11 (91.67)	1 (8.33)
Rep of Macedonia	0 (0)	27 (100)	0 (0)	0 (0)	27 (100)	0 (0)
Rep of Moldova	14 (100)	-	-	0 (0)	13 (92.86)	1 (7.14)
The Netherlands	97 (12.45)	671 (86.14)	11 (1.41)	61 (7.83)	626 (80.36)	92 (11.81)
Portugal	6 (5.83)	92 (89.32)	5 (4.85)	5 (4.85)	90 (87.38)	8 (7.77)
Russian Federation	230 (36.74)	388 (61.98)	8 (1.28)	58 (9.27)	546 (87.22)	22 (3.51)
Serbia	1 (2.17)	45 (97.83)	0 (0)	1 (2.17)	45 (97.83)	0 (0)
Slovak Republic	1 (0.83)	119 (98.35)	1 (0.83)	2 (1.65)	108 (89.26)	11 (9.09)
Slovenia	8 (30.77)	17 (65.38)	1 (3.85)	13 (50)	10 (38.46)	3 (11.54)
Spain	131 (21.10)	467 (75.20)	23 (3.70)	49 (7.89)	529 (85.19)	43 (6.92)
Sweden	0 (0)	370 (94.39)	22 (5.61)	0 (0)	356 (90.82)	36 (9.18)
Switzerland	33 (9.32)	298 (84.18)	23 (6.50)	24 (6.78)	284 (80.23)	46 (12.99)
Ukraine	13 (100)	-	-	0 (0)	13 (100)	0 (0)
United Kingdom	0 (0)	4774 (91.61)	437 (8.39)	0 (0)	4875 (93.55)	336 (6.45)

Note: Romania has only one adult patient and is excluded from the table.

6. Nutrition

Pancreatic insufficiency is usually defined as absence of pancreatic enzymes in two stool samples (or elevated levels of fat in stools). However, since information on both was rarely collected by the national registries, we used information on the use of pancreatic enzymes as an indicator of pancreatic insufficiency.

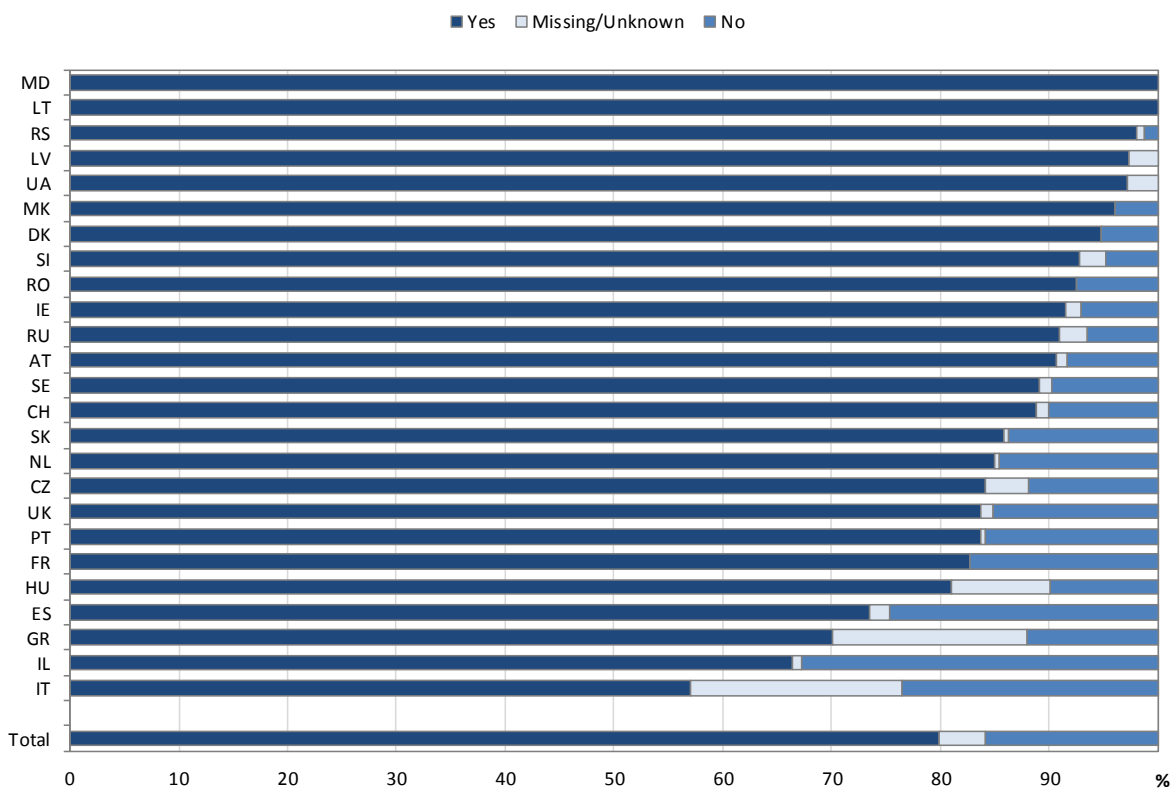
We collected weight and height measured at the time when the FEV_1 value was recorded, and, for patients that did not perform spirometry, the last measurements in the year were considered. From these raw values we calculated body mass index (BMI). A patient with a low weight is not necessarily underweight if the height is also low, and BMI may better illustrate the nutritional status: BMI describes the weight/height relationship and is considered a good measure of nutritional status. The ECFS Standards of Care recommend BMI of greater than 20 kg/(m^2). [2]

Weight, height and BMI were then expressed in terms of so-called z-scores by using a reference population of healthy individuals (in this case the US population with reference values issued by the Centre for Disease Control, USA, see Appendix 1, page 120, for details).

A z-score of 0 means that the height/weight/BMI is equal to the mean height/weight/BMI of people of the same age and sex of the reference population. A z-score of -2 means that the height/weight/BMI value is 2 standard deviations below the mean height/weight/BMI of people of the same age and sex of the reference population; a z-score of +2 means that the value is 2 standard deviations above that mean. In the reference population, 95% of all individuals have a z-score for weight between -2 and +2 (the same for height) and it is expected that the same happens for approximately 95% of individuals of a population without conditions that affect weight (or height). The average z-score for a largely healthy population should be very close to zero.

[2] A.R. Smyth et al, JCF 2014;13, S23–S42

Figure 6.1 Use of pancreatic enzymes in 2014 for all patients, by country and overall.



Note: For Greece and Italy the information on use of pancreatic enzymes is missing for more than 10% of the patients.

This graph shows the use of pancreatic enzymes by country. This can be seen as an informed estimate of pancreatic insufficiency.

Table 6.1 Number of patients for whom height and weight measurements were available. All patients seen in 2014.

Country	Number of patients	Height		Weight	
		N	N miss	N	N miss
Austria	687	657	30	658	29
Czech Republic	599	534	65	530	69
Denmark	459	451	8	451	8
France	6369	6171	198	6146	223
Greece	507	365	142	364	143
Hungary	557	500	57	505	52
Ireland	942	887	55	862	80
Israel	547	507	40	508	39
Italy	4980	4056	924	4054	926
Latvia	38	21	17	21	17
Lithuania	12	12	0	12	0
Rep of Macedonia	100	99	1	99	1
Rep of Moldova	61	61	0	61	0
The Netherlands	1378	1368	10	1347	31
Portugal	258	241	17	241	17
Romania	40	40	0	40	0
Russian Federation	2121	1967	154	1990	131
Serbia	154	148	6	149	5
Slovak Republic	241	208	33	208	33
Slovenia	84	82	2	82	2
Spain	1481	1360	121	1362	119
Sweden	626	623	3	622	4
Switzerland	736	714	22	714	22
Ukraine	107	103	4	103	4
United Kingdom	9430	9275	155	9296	134

Table 6.2 Z-scores for height: descriptive statistics by country. Patients aged 17 years or younger.

Country	N	Mean	Min	25th pctl (25% of the patients are below this z-score for height)	Median (50% of the patients are below this z-score for height)	75th pctl (75% of the patients are below this z-score for height)	Max
Austria	361	-0.1	-3.7	-0.7	-0.1	0.7	4.9
Czech Republic	325	0.1	-5.5	-0.7	0.0	0.9	4.5
Denmark	191	-0.1	-2.9	-0.6	-0.2	0.6	2.6
France	3002	-0.5	-5.1	-1.2	-0.5	0.2	4.2
Greece	162	-0.2	-4.0	-0.9	-0.2	0.6	3.0
Hungary	295	0.0	-4.4	-0.8	0.0	0.8	6.3
Ireland	507	-0.3	-4.2	-0.9	-0.3	0.3	2.6
Israel	225	-0.5	-3.0	-1.2	-0.4	0.2	2.7
Italy	1610	-0.3	-4.0	-1.0	-0.2	0.4	3.7
Latvia	15	-0.1	-1.7	-0.6	-0.2	0.4	1.3
Rep of Macedonia	77	-0.7	-4.4	-1.5	-1.0	0.3	1.5
Rep of Moldova	48	-1.4	-9.5	-2.3	-1.4	-0.3	2.3
The Netherlands	616	0.2	-5.5	-0.4	0.3	0.9	3.6
Portugal	150	-0.6	-4.3	-1.2	-0.7	0.2	3.7
Romania	39	-0.1	-2.5	-1.0	-0.2	0.9	2.1
Russian Federation	1439	-0.6	-7.0	-1.4	-0.5	0.3	5.7
Serbia	109	-0.4	-6.8	-1.1	-0.3	0.5	2.9
Slovak Republic	91	0.3	-2.3	-0.5	0.2	1.0	3.0
Slovenia	60	0.0	-2.6	-0.8	-0.1	0.7	3.6
Spain	798	-0.3	-4.8	-1.0	-0.3	0.4	2.8
Sweden	242	0.0	-2.3	-0.7	0.0	0.5	3.5
Switzerland	388	-0.4	-4.2	-1.0	-0.3	0.2	2.5
Ukraine	92	-0.5	-3.6	-1.4	-0.6	0.1	3.4
United Kingdom	4200	-0.4	-8.1	-1.2	-0.4	0.3	5.9

Note: For Lithuania coverage is 0% for children.

This table reports the median z-score for height (the value that separates the highest and lowest half of the patients), the mean z-score for height (the average) and other descriptive statistics for children (17 years or younger).

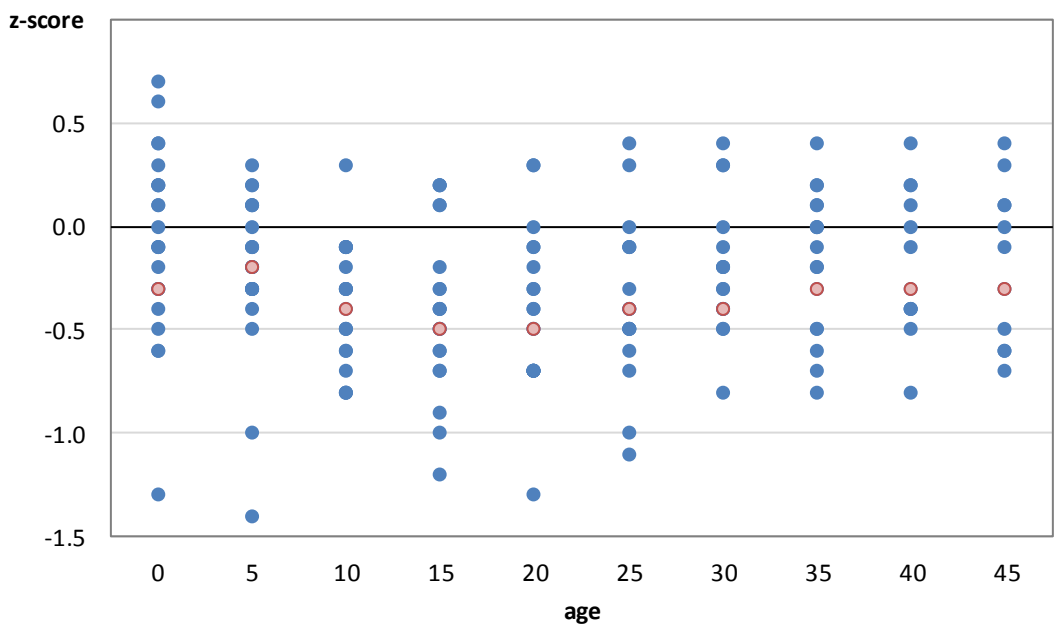
Table 6.3 Z-scores for height: descriptive statistics by country. Patients aged 18 years or older.

Country	N	Mean	Min	25th pctl (25% of the patients are below this z-score for height)	Median (50% of the patients are below this z-score for height)	75th pctl (75% of the patients are below this z-score for height)	Max
Austria	296	-0.3	-4.2	-0.8	-0.3	0.3	2.6
Czech Republic	209	-0.1	-2.9	-0.7	-0.1	0.4	3.1
Denmark	260	0.1	-2.5	-0.6	0.1	0.8	3.2
France	3169	-0.5	-5.7	-1.2	-0.5	0.1	3.0
Greece	203	-0.5	-2.8	-1.1	-0.5	0.2	2.0
Hungary	205	-0.1	-3.4	-1.0	-0.1	0.6	3.6
Ireland	380	-0.4	-4.9	-1.0	-0.4	0.3	2.0
Israel	282	-0.6	-4.3	-1.3	-0.6	0.1	1.6
Italy	2446	-0.6	-4.4	-1.2	-0.5	0.1	3.7
Latvia	<10	0.5	-0.7	-0.4	0.6	1.2	1.4
Lithuania	12	0.5	-2.1	-0.2	0.3	1.4	2.4
Rep of Macedonia	22	-0.6	-2.7	-1.2	-0.7	-0.3	2.3
Rep of Moldova	13	-0.2	-2.3	-1.0	-0.4	1.0	2.0
The Netherlands	752	0.3	-3.4	-0.4	0.4	1.0	3.9
Portugal	91	-0.8	-3.0	-1.5	-1.0	-0.1	1.3
Russian Federation	528	-0.3	-4.8	-1.0	-0.3	0.4	3.4
Serbia	39	0.0	-2.6	-0.6	-0.1	0.6	2.4
Slovak Republic	117	0.0	-4.1	-0.5	0.1	0.9	2.4
Slovenia	22	0.0	-1.5	-0.8	0.2	0.6	2.4
Spain	562	-0.7	-3.8	-1.3	-0.7	-0.1	2.1
Sweden	381	0.1	-2.9	-0.5	0.2	0.7	3.3
Switzerland	326	-0.2	-3.7	-0.8	-0.2	0.4	2.4
Ukraine	11	-0.4	-1.4	-0.8	-0.5	0.1	0.6
United Kingdom	5075	-0.4	-4.9	-1.0	-0.4	0.3	3.5

Note: Romania has only one adult patient and is excluded from the table.

This table reports the median z-score for height (the value that separates the highest and lowest half of the patients), the mean z-score for height (the average), and other descriptive statistics for adults (18 years or older).

Figure 6.2 Median z-scores for height by age group and by country. All patients seen in 2014.



Note: We excluded from the analyses those age groups where the number of patients was <10.

This graph shows the median z-scores for height by age group. Each country is represented by a dot (in blue) and the overall estimate is in red. The median z-scores for height tend to slowly decrease up to the teenage years and then rise again before levelling out. Since the z-scores are computed using healthy people as a reference, this pattern can be explained by the fact that CF patients reach the puberty growth spurt later than their peers, but then catch up. The graph also shows that there is large variability between countries.

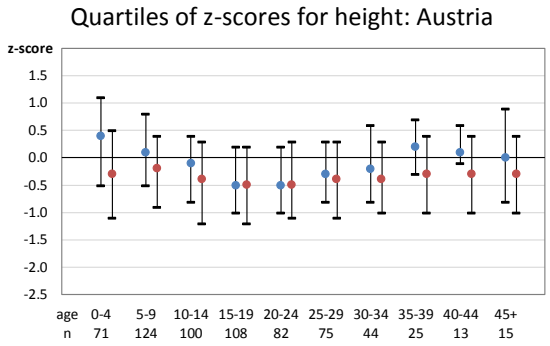
Table 6.4 Z-scores for height: descriptive statistics by age group. All patients seen in 2014.

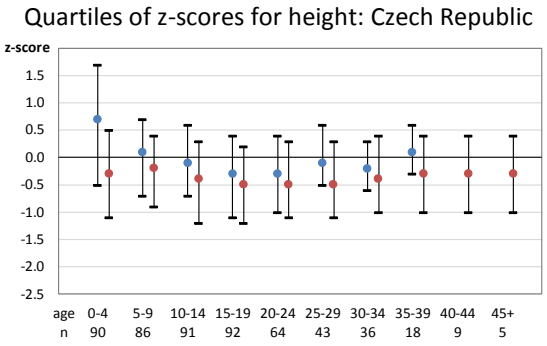
Age at height measurement	N	Mean	Min	25th pctl	Median	75th pctl	Max
0-4	3659	-0.3	-9.5	-1.1	-0.3	0.5	6.3
5-9	4574	-0.2	-6.2	-0.9	-0.2	0.4	3.8
10-14	4267	-0.4	-7.4	-1.2	-0.4	0.3	5.9
15-19	4174	-0.5	-5.7	-1.2	-0.5	0.2	2.9
20-24	3856	-0.4	-4.6	-1.1	-0.5	0.3	3.9
25-29	3157	-0.4	-5.1	-1.1	-0.4	0.3	3.4
30-34	2357	-0.3	-5.7	-1.0	-0.4	0.4	3.6
35-39	1646	-0.3	-4.1	-1.0	-0.3	0.4	3.3
40-44	1157	-0.3	-3.7	-1.0	-0.3	0.4	2.7
45+	1603	-0.3	-4.9	-1.0	-0.3	0.4	3.3

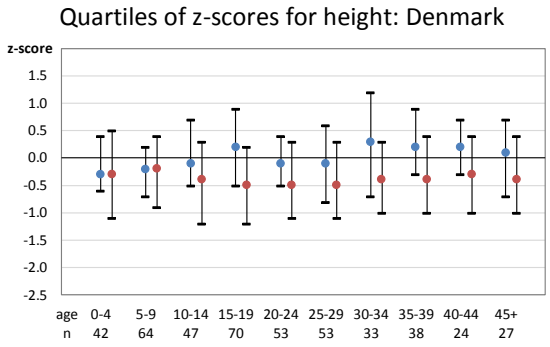
This table reports the median z-score for height and other descriptive statistics by age group for all the patients seen in 2014. The median values reported in this table are shown as red dots in fig 6.2.

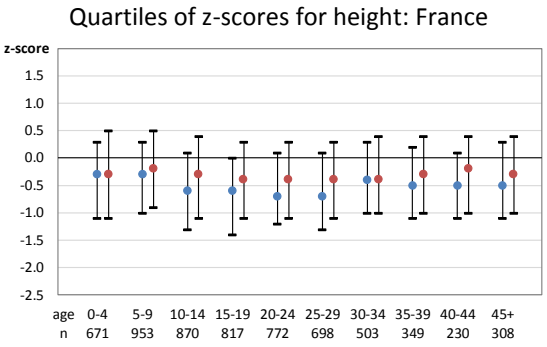
Figure 6.3 Quartiles of z-scores for height by age group and by country. All patients seen in 2014.

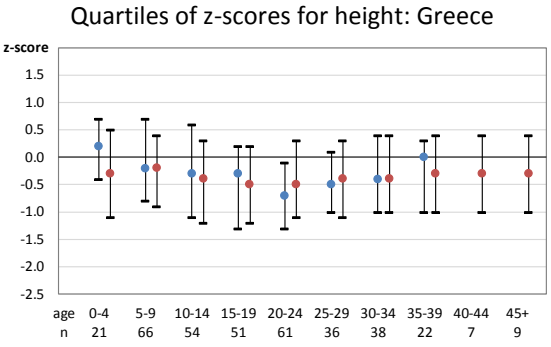
The figures below show the z-scores for height by country. The dot is the median and the whiskers show the 25th and 75th percentiles. In blue are the quartiles for the country, in red are the pooled quartiles computed on all other countries (i.e. excluding that country). We did not compute quartiles where the number of patients in the age group is <10, therefore there are no blue dots for those age groups (the number of patients in each age group is shown underneath the horizontal axis). We therefore excluded Latvia and Lithuania from the graphs because none of the age groups in these countries had more than 10 patients.

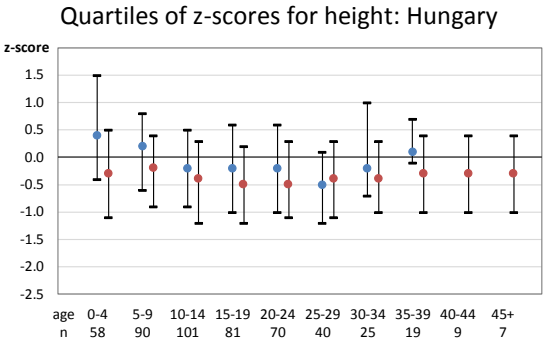


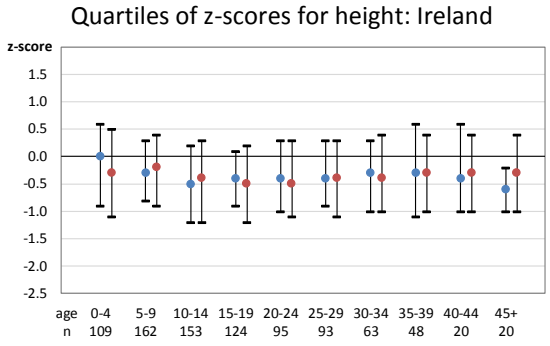


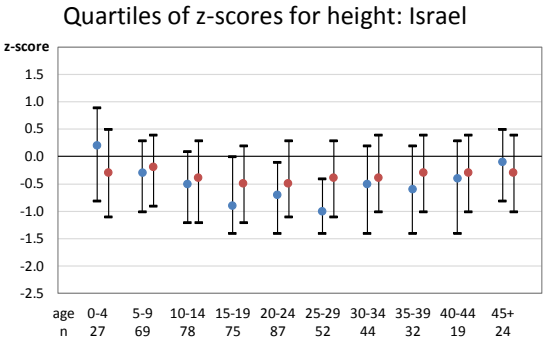






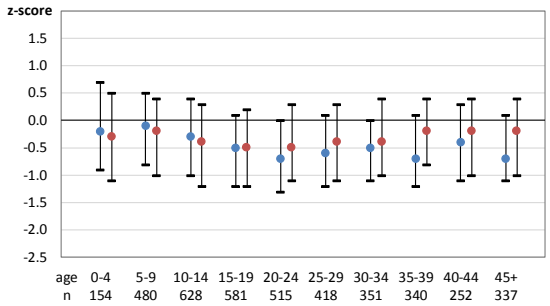




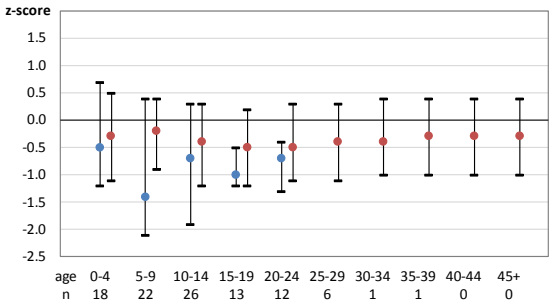


[figure 6.3 continued]

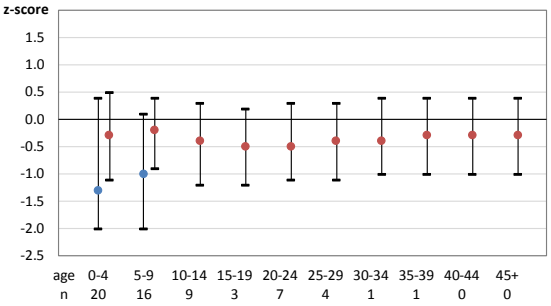
Quartiles of z-scores for height: Italy



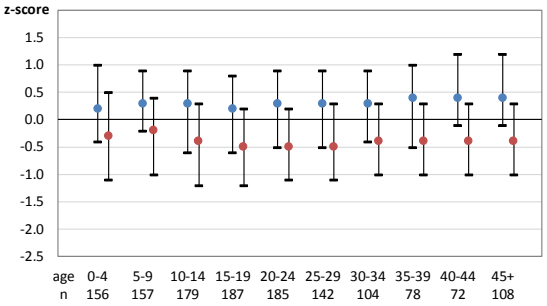
Quartiles of z-scores for height: Rep of Macedonia



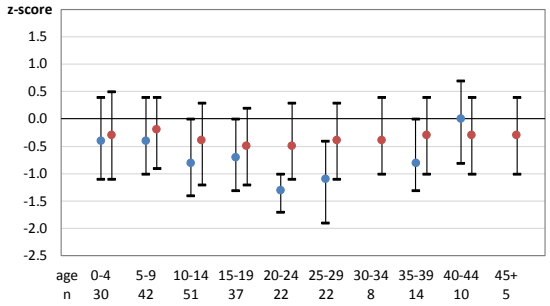
Quartiles of z-scores for height: Rep of Moldova



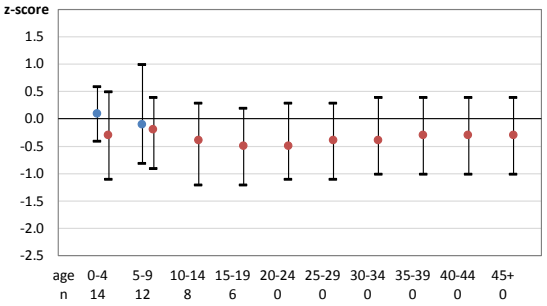
Quartiles of z-scores for height: The Netherlands



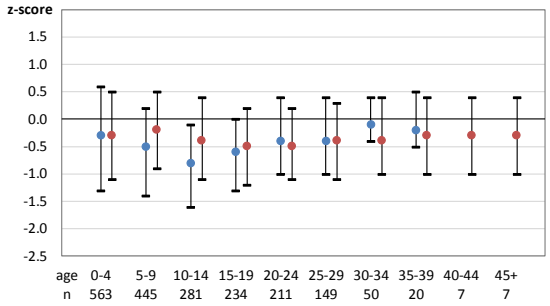
Quartiles of z-scores for height: Portugal



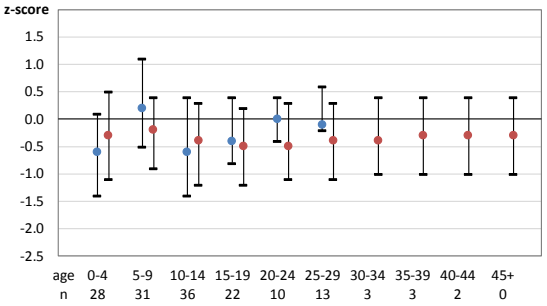
Quartiles of z-scores for height: Romania



Quartiles of z-scores for height: Russian Federation

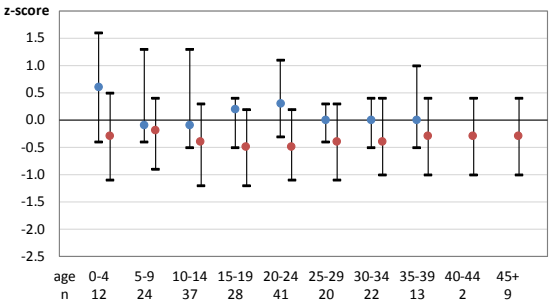


Quartiles of z-scores for height: Serbia

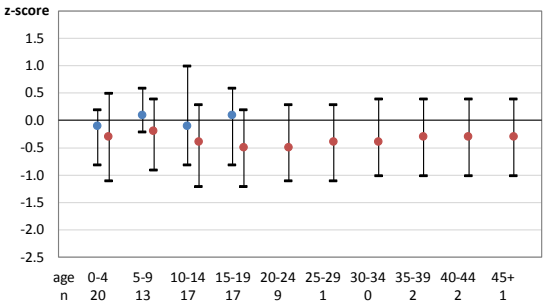


[figure 6.3 continued]

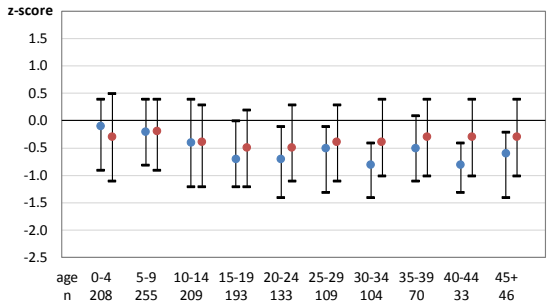
Quartiles of z-scores for height: Slovak Republic



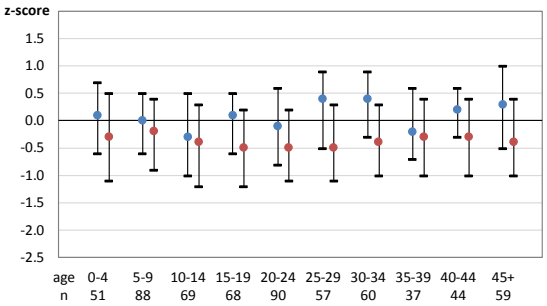
Quartiles of z-scores for height: Slovenia



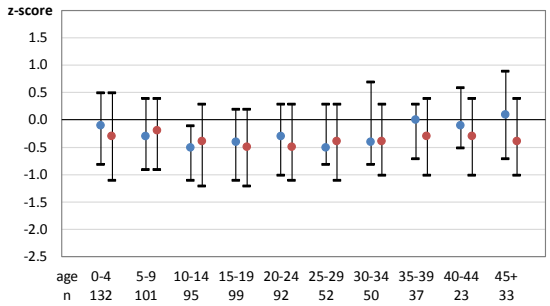
Quartiles of z-scores for height: Spain



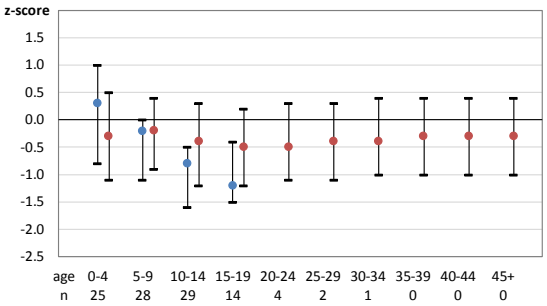
Quartiles of z-scores for height: Sweden



Quartiles of z-scores for height: Switzerland



Quartiles of z-scores for height: Ukraine



Quartiles of z-scores for height: United Kingdom

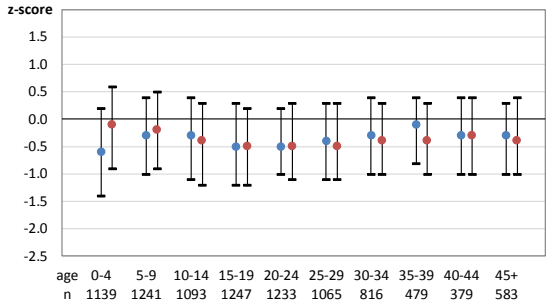


Table 6.5 Z-scores for weight: descriptive statistics by country. Patients aged 17 years or younger.

Country	N	Mean	Min	25th pctl (25% of the patients are below this z-score for weight)	Median (50% of the patients are below this z-score for weight)	75th pctl (75% of the patients are below this z-score for weight)	Max
Austria	361	-0.4	-4.6	-1.0	-0.3	0.4	2.7
Czech Republic	325	-0.1	-5.0	-0.8	-0.1	0.6	5.9
Denmark	191	-0.3	-3.7	-1.0	-0.3	0.3	1.8
France	3005	-0.6	-5.4	-1.3	-0.6	0.1	5.7
Greece	162	0.0	-3.6	-0.8	0.1	0.8	3.1
Hungary	300	-0.7	-9.7	-1.6	-0.6	0.2	4.2
Ireland	519	-0.1	-4.3	-0.8	-0.1	0.6	2.6
Israel	226	-0.4	-3.3	-1.2	-0.4	0.3	2.3
Italy	1610	-0.3	-8.5	-1.0	-0.2	0.5	3.0
Latvia	15	-0.8	-2.9	-1.3	-0.7	-0.1	0.4
Rep of Macedonia	77	-0.4	-4.2	-1.3	-0.5	0.4	2.4
Rep of Moldova	48	-1.3	-8.6	-2.1	-1.1	0.1	2.6
The Netherlands	616	0.0	-5.3	-0.6	0.1	0.6	3.1
Portugal	150	-0.7	-8.8	-1.4	-0.6	0.1	2.5
Romania	39	-0.7	-4.1	-1.5	-0.7	0.3	1.9
Russian Federation	1460	-0.9	-9.4	-1.7	-0.8	0.0	3.4
Serbia	110	-0.6	-9.3	-1.3	-0.4	0.4	2.3
Slovak Republic	91	-0.3	-2.7	-1.0	-0.3	0.4	2.3
Slovenia	60	-0.6	-7.1	-1.3	-0.5	0.2	2.0
Spain	799	-0.4	-4.8	-1.0	-0.4	0.4	4.3
Sweden	242	-0.2	-3.2	-0.7	-0.1	0.5	2.6
Switzerland	388	-0.5	-4.0	-1.1	-0.4	0.3	2.6
Ukraine	92	-1.0	-7.1	-1.8	-1.0	-0.3	1.8
United Kingdom	4290	-0.3	-8.5	-1.0	-0.2	0.5	8.5

Note: For Lithuania coverage is 0% for children.

This table reports the median z-score for weight (the value that separates the highest and lowest half of the patients), the mean z-score for weight (the average), and other descriptive statistics for children (17 years or younger).

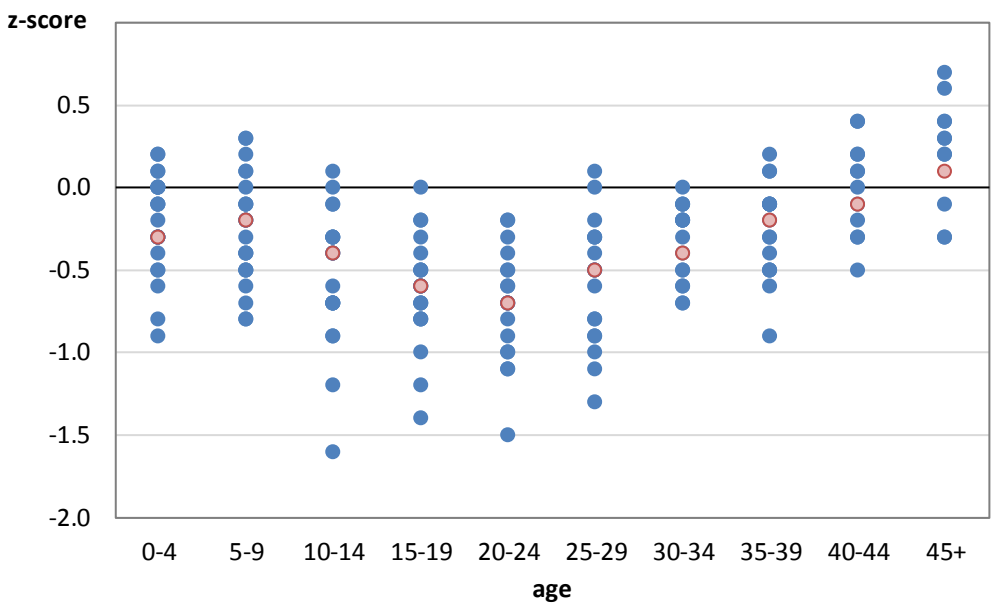
Table 6.6 Z-scores for weight: descriptive statistics by country. Patients aged 18 years or older.

Country	N	Mean	Min	25th pctl (25% of the patients are below this z-score for weight)	Median (50% of the patients are below this z-score for weight)	75th pctl (75% of the patients are below this z-score for weight)	Max
Austria	297	-0.6	-6.4	-1.3	-0.5	0.2	2.4
Czech Republic	205	-0.6	-5.8	-1.3	-0.5	0.2	2.0
Denmark	260	-0.3	-3.8	-1.0	-0.2	0.5	2.0
France	3141	-0.8	-8.2	-1.6	-0.7	-0.1	2.8
Greece	202	-0.6	-5.4	-1.3	-0.4	0.2	2.0
Hungary	205	-0.9	-7.3	-1.7	-0.9	0.2	1.8
Ireland	343	-0.3	-5.8	-0.9	-0.3	0.4	2.2
Israel	282	-0.5	-4.6	-1.2	-0.4	0.4	2.2
Italy	2444	-0.6	-6.8	-1.2	-0.5	0.2	3.2
Latvia	<10	-0.5	-1.2	-1.2	-0.6	0.0	0.4
Lithuania	12	-0.7	-3.0	-1.2	-0.3	0.0	0.6
Rep of Macedonia	22	-0.9	-2.6	-1.2	-0.8	-0.4	0.9
Rep of Moldova	13	-1.4	-4.1	-2.8	-1.1	-0.3	0.4
The Netherlands	731	-0.1	-4.4	-0.6	0.0	0.6	2.5
Portugal	91	-0.6	-4.4	-1.2	-0.5	0.2	2.2
Russian Federation	530	-1.3	-6.5	-2.1	-1.2	-0.4	2.4
Serbia	39	-1.1	-5.8	-1.3	-1.0	-0.4	1.2
Slovak Republic	117	-0.5	-4.4	-1.3	-0.3	0.4	2.3
Slovenia	22	-0.7	-2.1	-1.3	-0.7	-0.1	0.7
Spain	563	-0.6	-5.4	-1.3	-0.6	0.1	3.6
Sweden	380	-0.1	-4.6	-0.7	0.0	0.6	2.9
Switzerland	326	-0.6	-7.6	-1.2	-0.5	0.1	2.3
Ukraine	11	-1.7	-4.9	-1.8	-1.4	-0.9	-0.6
United Kingdom	5006	-0.3	-8.9	-0.9	-0.2	0.5	3.8

Note: Romania has only one adult patient and is excluded from the table.

This table reports the median z-score for weight (the value that separates the highest and lowest half of the patients), the mean z-score for weight (the average), and other descriptive statistics for adults (18 years or older).

Figure 6.4 Median z-scores for weight by age group and by country. All patients seen in 2014.



Note: We excluded from the analyses those age groups where the number of patients was <10.

This graph shows the median z-scores for weight by age group. Each country is represented by a dot (in blue) and the overall estimate is in red. Overall, the median z-scores for weight decrease from the third youngest age group to the 20-24 years age group before they increase in the older age groups. Again, the patients in the oldest age groups are patients that survived, and may therefore represent the patients with less disease severity. There is considerable variability between countries.

Table 6.7 Z-scores for weight: descriptive statistics by age group. All patients seen in 2014.

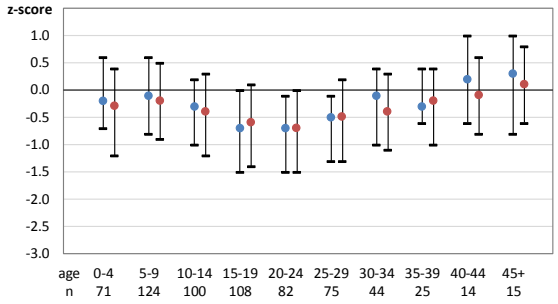
Age at weight measurement	N	Mean	Min	25th pctl	Median	75th pctl	Max
0-4	3740	-0.4	-9.4	-1.2	-0.3	0.4	8.5
5-9	4586	-0.2	-5.2	-0.9	-0.2	0.5	3.1
10-14	4280	-0.5	-8.5	-1.2	-0.4	0.3	3.4
15-19	4186	-0.7	-9.7	-1.4	-0.6	0.1	2.5
20-24	3819	-0.8	-7.6	-1.5	-0.7	0.0	2.8
25-29	3127	-0.7	-7.2	-1.3	-0.5	0.2	3.6
30-34	2334	-0.4	-8.9	-1.1	-0.4	0.3	3.1
35-39	1628	-0.3	-6.2	-1.0	-0.2	0.4	3.8
40-44	1136	-0.1	-5.2	-0.8	-0.1	0.6	2.7
45+	1589	0.0	-5.5	-0.6	0.1	0.8	2.9

This table reports the median z-score for weight and other descriptive statistics by age group for all the patients seen in 2014. The median values reported in this table are shown as red dots in fig 6.4.

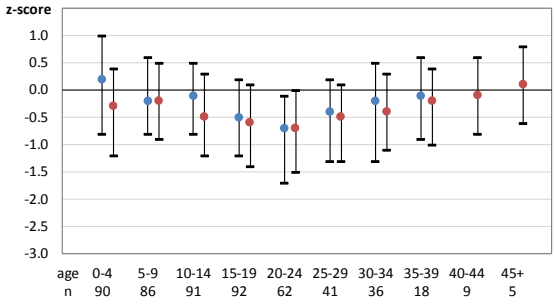
Figure 6.5 Quartiles of z-scores for weight by age group and by country. All patients seen in 2014.

The figures below show the z-scores for weight by country. The dot is the median, and the whiskers show the 25th and 75th percentiles. In blue are the quartiles for the country, in red are the pooled quartiles computed on all other countries (i.e. excluding that country). We did not compute quartiles where the number of patients in the age group is <10. Therefore, there are no blue dots for those age groups (the number of patients in each age group is shown underneath the horizontal axis). We excluded Latvia and Lithuania from the graphs because none of the age groups in these countries had more than 10 patients.

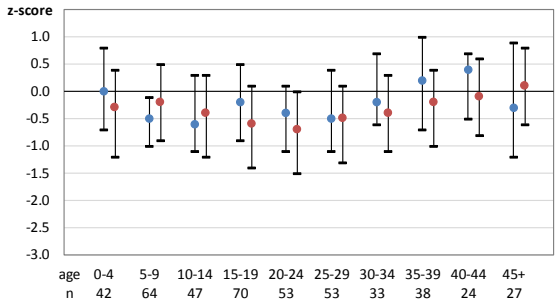
Quartiles of z-scores for weight: Austria



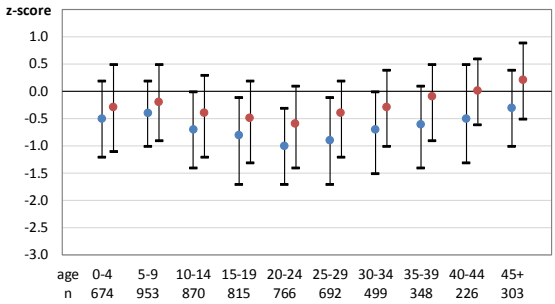
Quartiles of z-scores for weight: Czech Republic



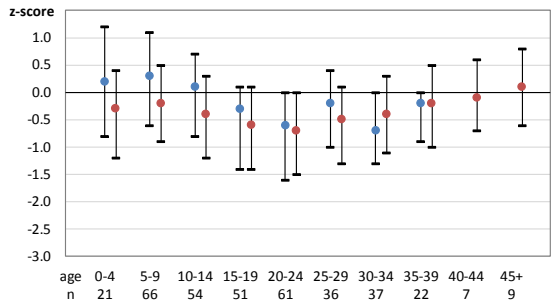
Quartiles of z-scores for weight: Denmark



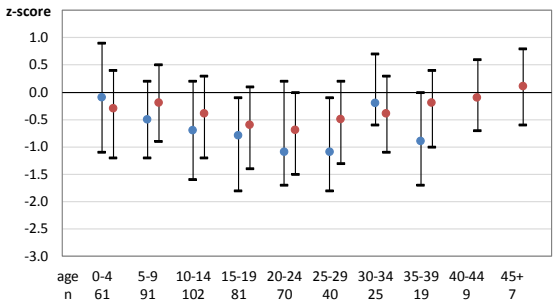
Quartiles of z-scores for weight: France



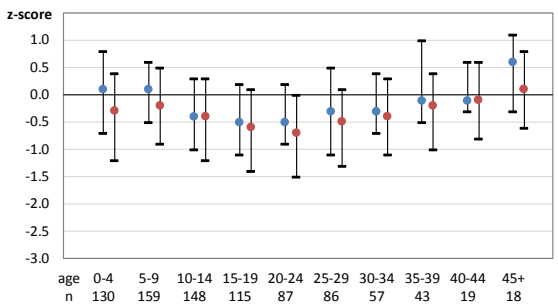
Quartiles of z-scores for weight: Greece



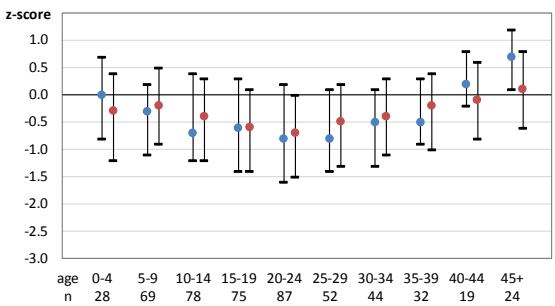
Quartiles of z-scores for weight: Hungary



Quartiles of z-scores for weight: Ireland

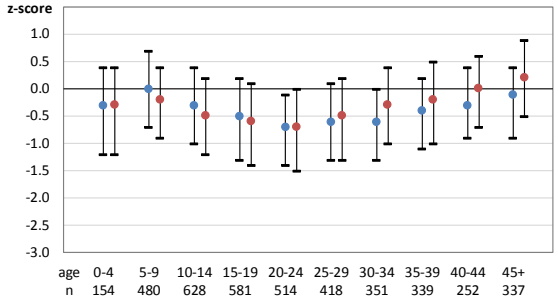


Quartiles of z-scores for weight: Israel

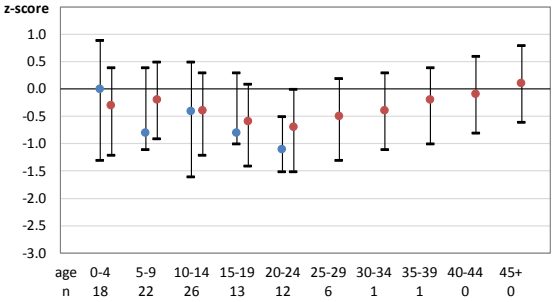


[figure 6.5 continued]

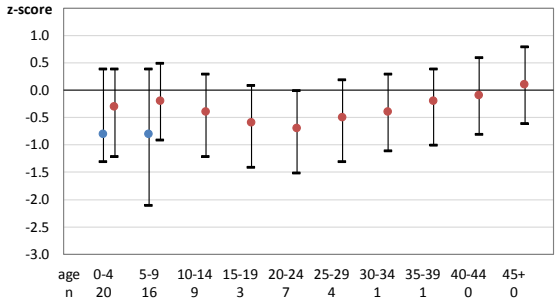
Quartiles of z-scores for weight: Italy



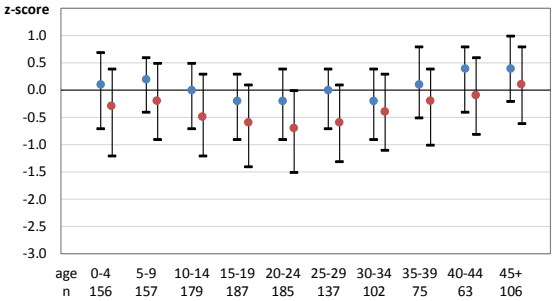
Quartiles of z-scores for weight: Rep of Macedonia



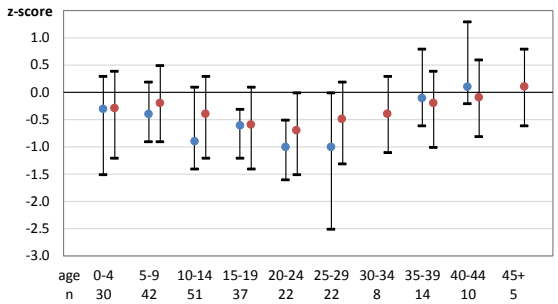
Quartiles of z-scores for weight: Rep of Moldova



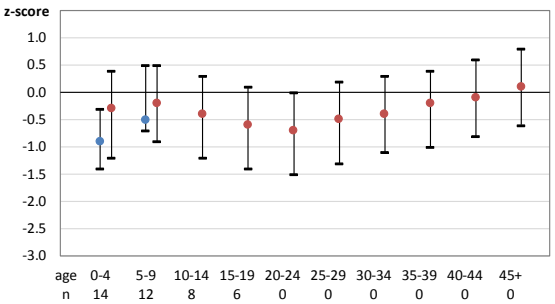
Quartiles of z-scores for weight: The Netherlands



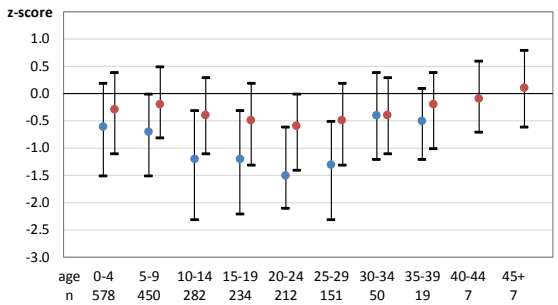
Quartiles of z-scores for weight: Portugal



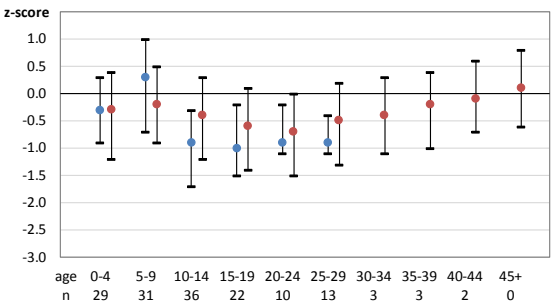
Quartiles of z-scores for weight: Romania



Quartiles of z-scores for weight: Russian Federation

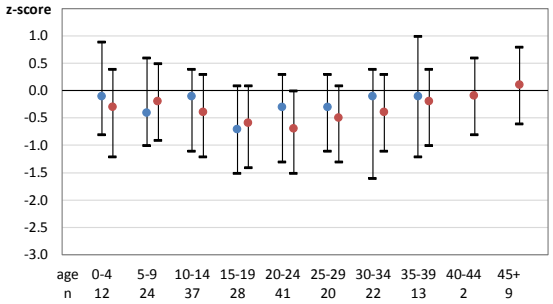


Quartiles of z-scores for weight: Serbia

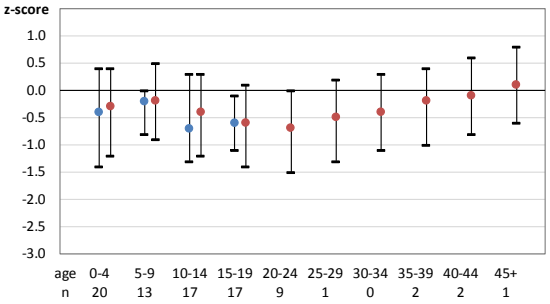


[figure 6.5 continued]

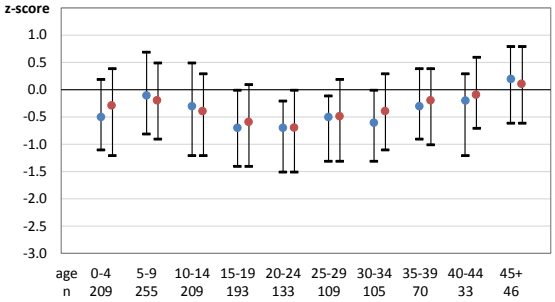
Quartiles of z-scores for weight: Slovak Republic



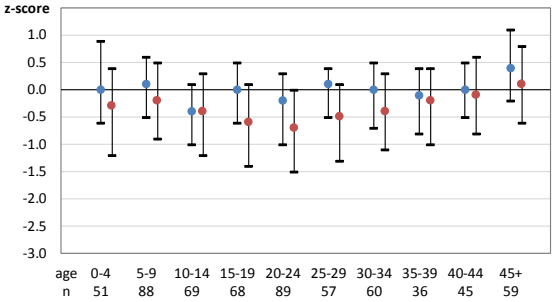
Quartiles of z-scores for weight: Slovenia



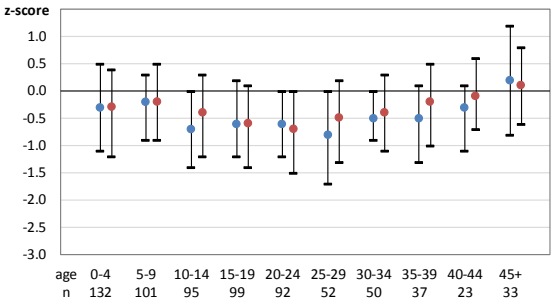
Quartiles of z-scores for weight: Spain



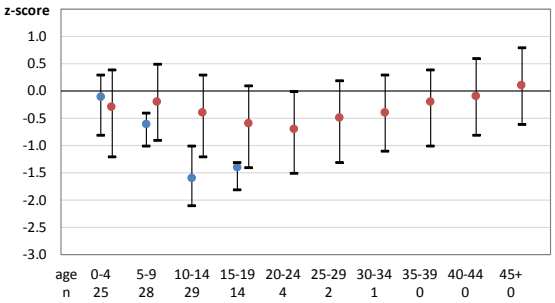
Quartiles of z-scores for weight: Sweden



Quartiles of z-scores for weight: Switzerland



Quartiles of z-scores for weight: Ukraine



Quartiles of z-scores for weight: United Kingdom

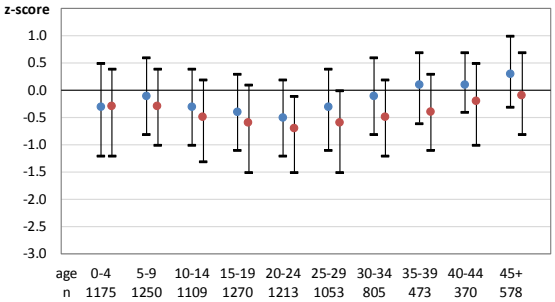


Table 6.8 Z-scores for BMI: descriptive statistics by country. All patients seen in 2014 aged 2-17 years.

Country	N	N Miss	Mean	Min	25th pctl (25% of the patients are below this z-score for BMI)	Median (50% of the patients are below this z-score for BMI)	75th pctl (75% of the patients are below this z-score for BMI)	Max
Austria	329	0	-0.4	-6.7	-1.1	-0.3	0.4	1.9
Czech Republic	288	1	-0.3	-3.9	-0.9	-0.1	0.5	2.0
Denmark	180	0	-0.4	-4.0	-1.1	-0.4	0.4	2.2
France	2782	9	-0.4	-5.6	-1.1	-0.4	0.2	2.5
Greece	158	0	0.3	-3.3	-0.3	0.3	1.0	2.6
Hungary	272	3	-1.0	-7.0	-1.7	-0.8	-0.1	2.4
Ireland	459	22	0.1	-3.6	-0.5	0.1	0.7	2.9
Israel	220	0	-0.2	-3.3	-1.0	-0.2	0.4	2.1
Italy	1559	53	-0.1	-5.6	-0.8	-0.1	0.6	3.1
Latvia	15	0	-1.0	-2.4	-2.1	-0.9	-0.4	0.2
Rep of Macedonia	69	0	0.1	-2.9	-0.6	-0.1	0.7	2.5
Rep of Moldova	42	0	-0.4	-6.6	-1.1	-0.3	0.6	2.9
The Netherlands	560	2	-0.1	-3.4	-0.7	-0.1	0.5	2.5
Portugal	137	0	-0.5	-6.5	-1.0	-0.4	0.2	2.4
Romania	33	0	-0.7	-3.7	-1.5	-0.6	0.2	1.6
Russian Federation	1223	15	-0.7	-9.4	-1.5	-0.6	0.2	3.6
Serbia	101	0	-0.4	-4.7	-1.1	-0.2	0.4	2.0
Slovak Republic	88	0	-0.5	-3.9	-1.2	-0.5	0.2	2.2
Slovenia	56	0	-0.7	-4.6	-1.5	-0.6	0.2	1.6
Spain	701	4	-0.2	-4.0	-0.8	-0.2	0.5	2.3
Sweden	227	0	-0.2	-3.4	-0.6	-0.1	0.4	2.1
Switzerland	341	1	-0.3	-3.9	-0.9	-0.2	0.4	2.3
Ukraine	83	0	-1.1	-6.2	-1.6	-0.9	-0.4	1.2
United Kingdom	3924	100	0.0	-9.3	-0.6	0.1	0.7	5.5

Note: For Lithuania coverage is 0% for children.

This table reports the median z-score for BMI, the mean z-score for BMI and other descriptive statistics for children aged 2 to 17 years, by country.

Table 6.9 BMI: descriptive statistics by country. All patients seen in 2014 aged 18 years or older.

Country	N	N Miss	Mean	Min	25th pctl (25% of the patients are below this BMI)	Median (50% of the patients are below this BMI)	75th pctl (75% of the patients are below this BMI)	Max
Austria	296	1	21.3	14.0	19.1	21.0	23.0	37.9
Czech Republic	205	31	21.0	12.7	18.9	20.5	22.7	32.6
Denmark	260	0	21.8	14.6	19.4	21.4	23.6	33.3
France	3139	52	21.1	12.0	18.8	20.7	22.7	43.9
Greece	202	2	21.5	15.0	19.7	21.2	23.1	31.8
Hungary	205	5	20.3	14.3	17.9	19.8	22.4	31.1
Ireland	343	41	22.4	13.1	20.1	21.9	24.3	35.1
Israel	282	0	22.4	15.4	19.8	22.0	24.6	40.1
Italy	2444	86	21.9	13.2	19.7	21.4	23.7	48.4
Latvia	<10	0	20.0	18.8	18.9	20.0	20.5	21.9
Lithuania	12	0	19.6	15.6	17.8	20.2	21.2	23.0
Rep of Macedonia	22	0	20.7	17.8	19.7	20.5	21.9	23.5
Rep of Moldova	13	0	19.0	15.0	17.6	19.4	20.3	22.5
The Netherlands	731	21	22.0	15.5	20.1	21.5	23.6	39.0
Portugal	91	0	22.2	15.1	20.0	21.6	24.1	35.0
Russian Federation	527	7	19.4	12.4	17.2	19.0	21.2	35.9
Serbia	39	0	19.2	14.1	17.8	19.2	20.7	24.2
Slovak Republic	117	0	21.0	14.7	18.6	20.7	23.3	32.5
Slovenia	22	0	20.2	16.9	18.6	20.2	21.3	27.2
Spain	562	11	21.9	14.5	19.8	21.6	23.4	44.3
Sweden	379	4	22.4	13.8	20.2	21.7	24.0	36.9
Switzerland	326	0	21.2	13.8	19.2	20.8	22.7	36.3
Ukraine	11	0	18.4	14.1	17.6	18.5	19.3	21.8
United Kingdom	4997	96	22.6	13.1	20.1	22.1	24.6	48.5

Note: Romania has only one adult patient and is excluded from the table.

This table reports the median BMI (expressed as absolute values, not as z-scores), the mean BMI and other descriptive statistics for patients aged 18 years or older, by country.

Table 6.10 BMI: descriptive statistics by country. All male patients seen in 2014 aged 18 years or older.

Country	N	N Miss	Mean	Min	25th pctl (25% of the patients are below this BMI)	Median (50% of the patients are below this BMI)	75th pctl (75% of the patients are below this BMI)	Max
Austria	163	0	21.7	14.3	19.4	21.5	23.6	37.9
Czech Republic	101	17	21.1	15.2	18.8	20.6	22.7	32.6
Denmark	138	0	22.4	15.5	20.2	21.9	24.7	32.5
France	1641	25	21.2	13.3	19.1	20.9	23.0	36.4
Greece	104	1	21.8	15.1	19.6	21.8	23.8	31.5
Hungary	119	4	20.8	15.5	18.4	20.5	23.1	31.1
Ireland	213	24	22.8	16.7	20.8	22.3	24.8	33.3
Israel	159	0	22.7	15.4	20.5	22.8	24.9	34.5
Italy	1291	42	22.4	14.7	20.3	22.1	24.3	42.2
Latvia	<10	0	20.2	18.8	19.9	20.0	20.5	21.9
Lithuania	<10	0	20.6	18.0	20.2	20.6	21.8	23.0
Rep of Macedonia	13	0	20.9	18.9	19.6	21.5	22.1	23.5
Rep of Moldova	<10	0	18.9	16.4	17.1	18.9	20.3	22.5
The Netherlands	409	16	22.2	15.6	20.4	22.0	23.8	30.4
Portugal	47	0	21.5	15.1	19.3	21.0	23.6	29.1
Russian Federation	298	5	19.7	12.4	17.6	19.3	21.4	35.9
Serbia	23	0	20.0	14.4	18.6	20.1	21.8	24.2
Slovak Republic	58	0	21.5	14.7	18.9	20.9	24.3	32.5
Slovenia	10	0	21.5	16.9	20.0	21.4	22.6	27.2
Spain	293	5	22.4	15.2	20.3	22.2	23.9	44.3
Sweden	197	3	23.2	16.3	20.9	22.8	25.1	35.7
Switzerland	183	0	21.5	13.8	19.7	21.5	23.0	36.3
Ukraine	<10	0	18.2	14.1	16.4	18.6	20.0	21.8
United Kingdom	2728	49	23.0	13.1	20.5	22.7	25.0	48.5

Note: Romania has only one adult patient and is excluded from the table.

This table reports the median BMI (expressed as absolute values, not as z-scores), the mean BMI and other descriptive statistics for male patients aged 18 years or older, by country.

Table 6.11 BMI: descriptive statistics by country. All female patients seen in 2014 aged 18 years or older.

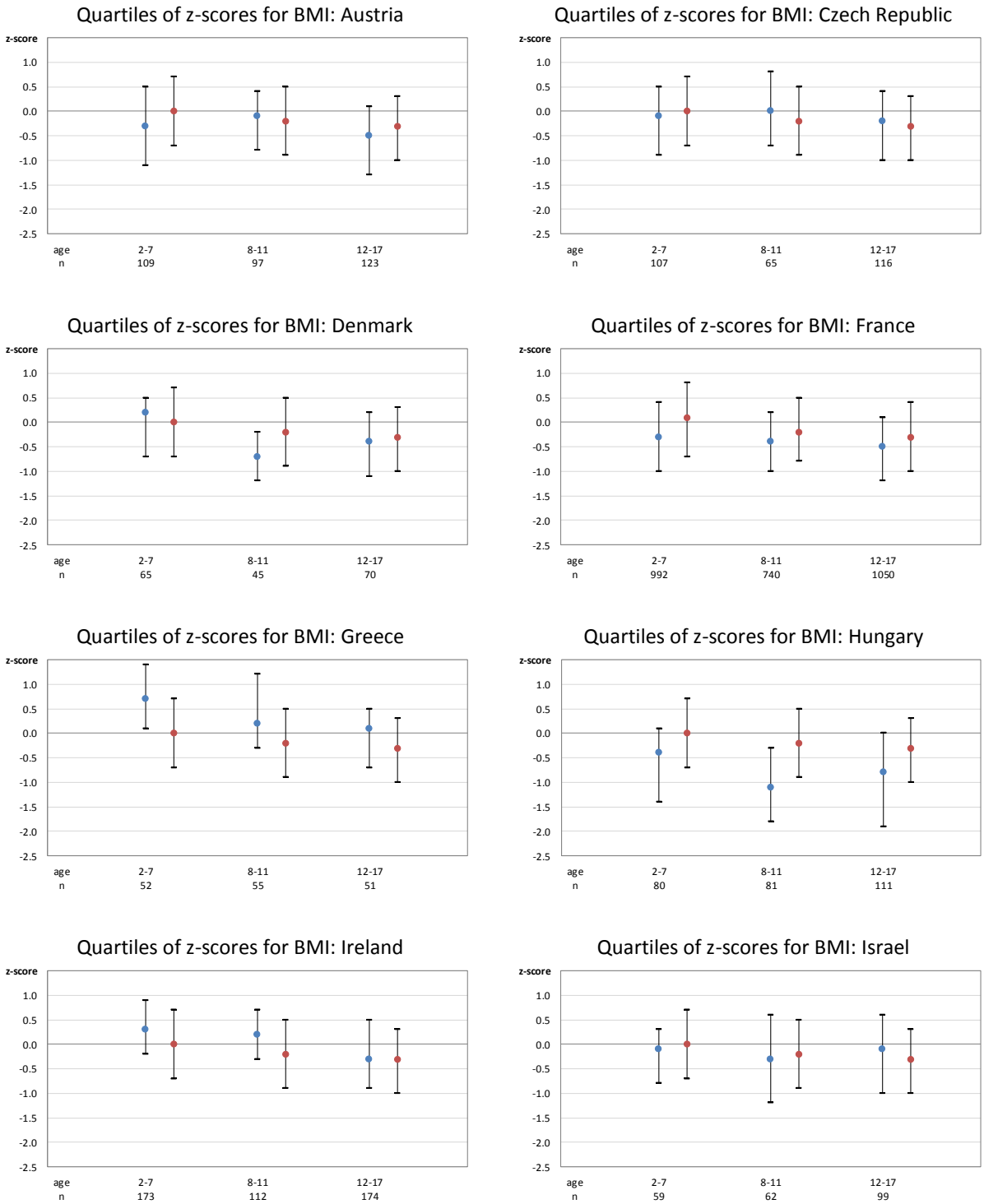
Country	N	N Miss	Mean	Min	25th pctl (25% of the patients are below this BMI)	Median (50% of the patients are below this BMI)	75th pctl (75% of the patients are below this BMI)	Max
Austria	133	1	20.7	14.0	18.8	20.2	22.1	34.4
Czech Republic	104	14	20.9	12.7	19.0	20.4	22.7	32.6
Denmark	122	0	21.1	14.6	18.8	20.7	22.6	33.3
France	1498	27	20.8	12.0	18.6	20.3	22.2	43.9
Greece	98	1	21.1	15.0	19.8	20.7	22.6	31.8
Hungary	86	1	19.7	14.3	17.5	19.2	21.1	30.1
Ireland	130	17	21.8	13.1	19.4	21.0	23.2	35.1
Israel	123	0	21.9	15.8	19.5	21.0	23.9	40.1
Italy	1153	44	21.3	13.2	19.1	20.7	22.6	48.4
Lithuania	<10	0	18.1	15.6	17.7	17.8	17.8	21.8
Rep of Macedonia	<10	0	20.5	17.8	20.1	20.4	20.8	22.3
Rep of Moldova	<10	0	19.2	15.0	18.8	20.0	20.3	21.7
The Netherlands	322	5	21.8	15.5	19.8	21.3	22.9	39.0
Portugal	44	0	23.0	15.9	20.5	22.4	24.8	35.0
Russian Federation	229	2	19.0	13.2	16.8	18.8	20.8	33.9
Serbia	16	0	18.1	14.1	17.5	18.4	19.1	20.2
Slovak Republic	59	0	20.6	14.8	18.2	20.7	22.4	27.3
Slovenia	12	0	19.2	17.6	17.9	19.0	20.2	20.8
Spain	269	6	21.4	14.5	19.2	20.9	22.6	40.5
Sweden	182	1	21.5	13.8	19.8	21.0	22.6	36.9
Switzerland	143	0	20.7	15.8	18.8	20.0	22.0	36.2
Ukraine	<10	0	18.7	18.2	18.2	18.5	19.3	19.3
United Kingdom	2269	47	22.3	13.4	19.6	21.5	23.9	47.2

Note: Latvia and Romania are excluded from the table; Latvia has only one adult female patient, Romania has no adult female patients.

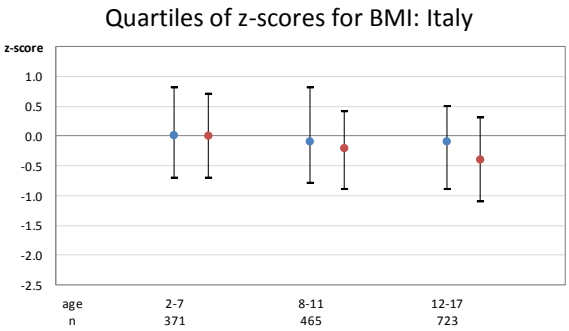
This table reports the median BMI (expressed as absolute values, not as z-scores), the mean BMI and other descriptive statistics, for female patients aged 18 years or older, by country.

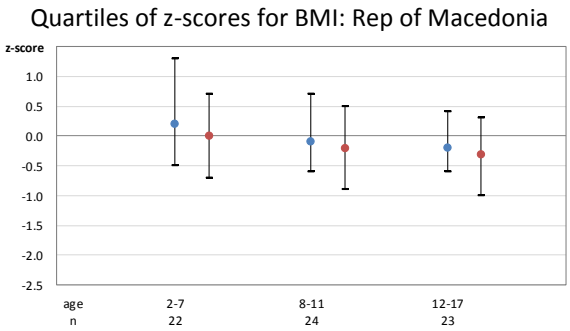
Figure 6.6 Quartiles of z-scores for BMI by age group and country. Patients aged 2-17 years in 2014.

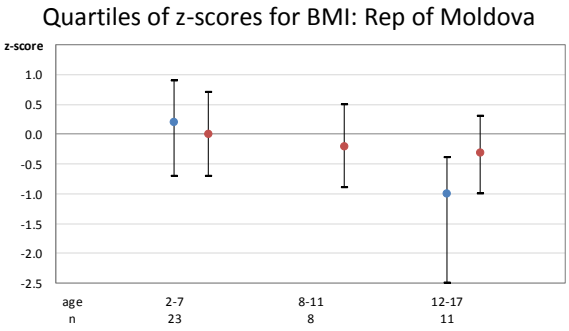
The figures below show the z-scores for BMI by country. The dot is the median, and the whiskers show the 25th and 75th percentiles. In blue are the quartiles for the country, in red are the pooled quartiles computed on all other countries (i.e. excluding that country). We did not compute quartiles where the number of patients in the age group is <10. Therefore, there are no blue dots for those age groups (the number of patients in each age group is shown underneath the horizontal axis). We excluded Latvia and Lithuania from the graphs because none of the age groups in these countries had more than 10 patients.

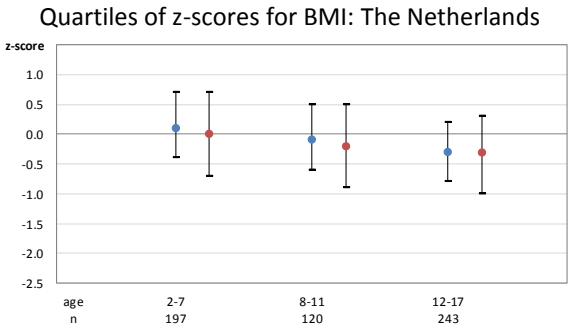


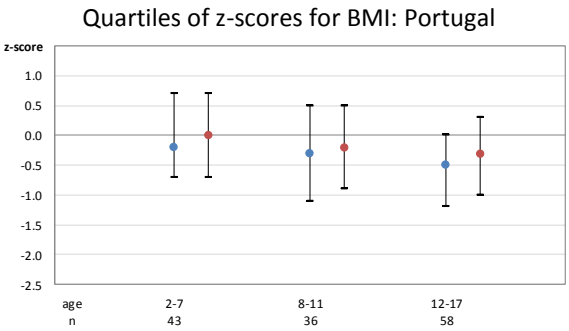
[figure 6.6 continued]

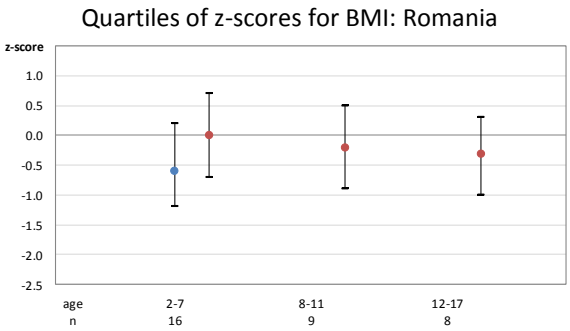


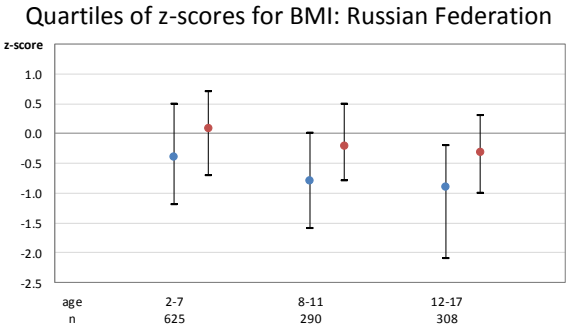


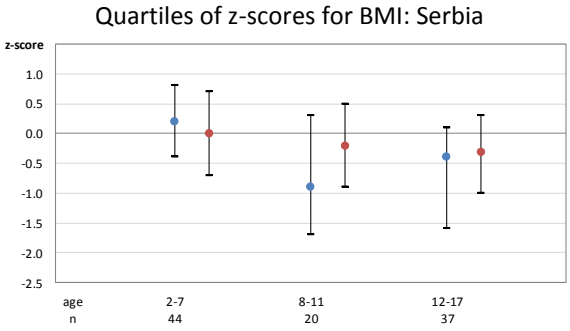






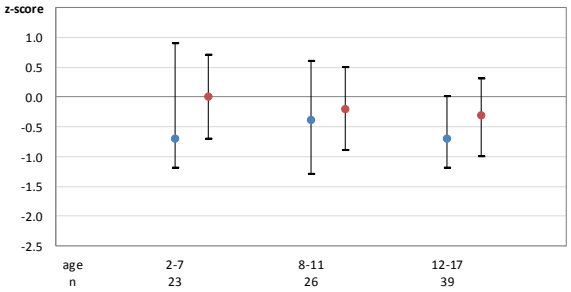




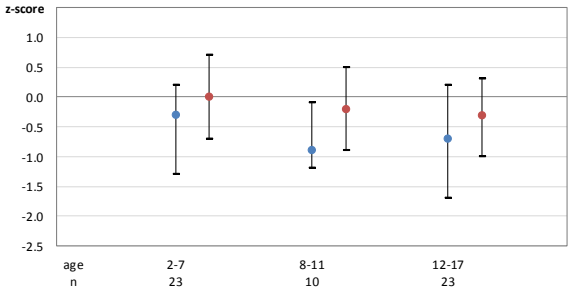


[figure 6.6 continued]

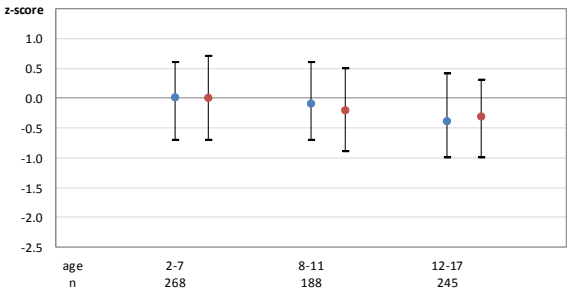
Quartiles of z-scores for BMI: Slovak Republic



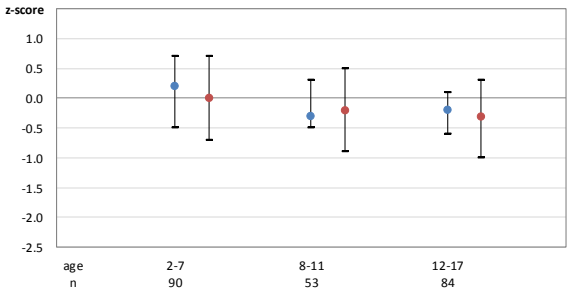
Quartiles of z-scores for BMI: Slovenia



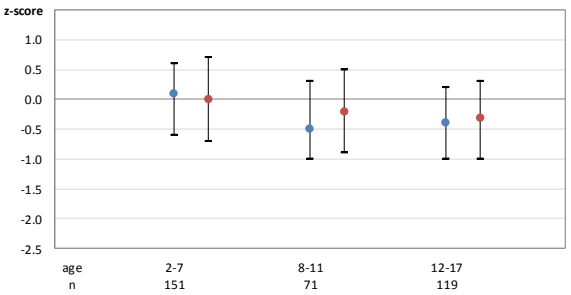
Quartiles of z-scores for BMI: Spain



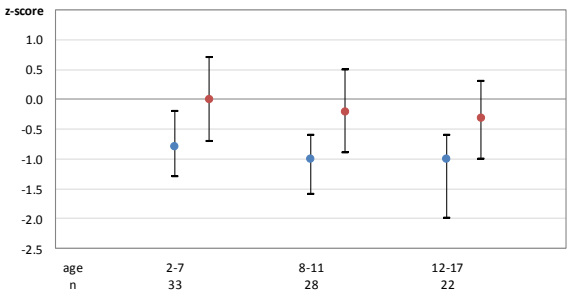
Quartiles of z-scores for BMI: Sweden



Quartiles of z-scores for BMI: Switzerland



Quartiles of z-scores for BMI: Ukraine



Quartiles of z-scores for BMI: United Kingdom

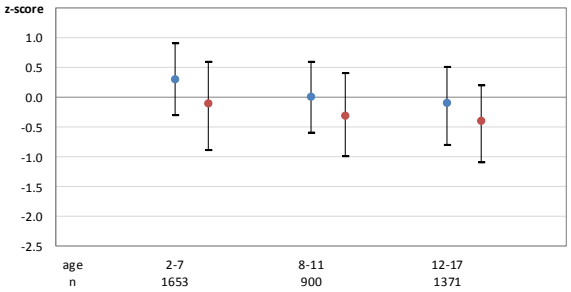
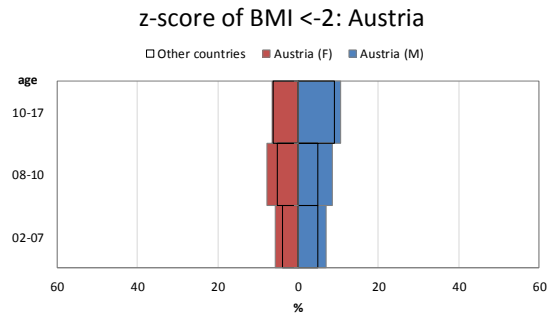
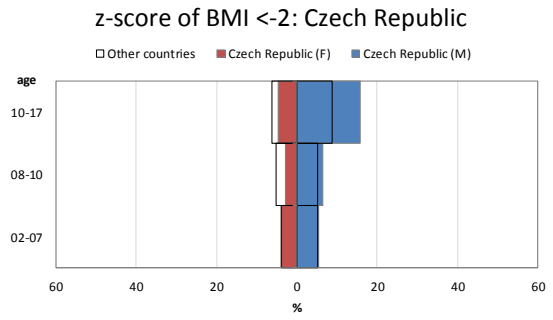
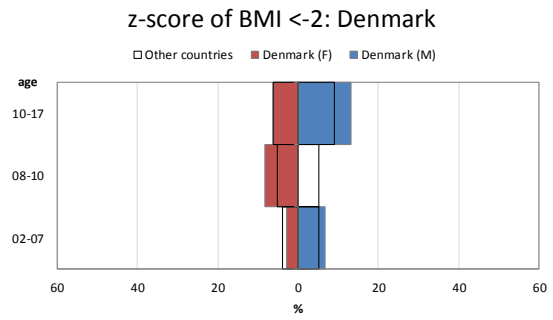


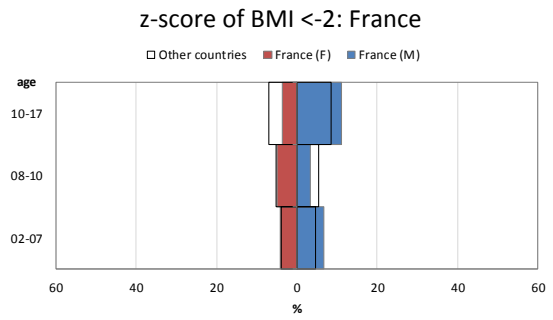
Figure 6.7 Proportion of paediatric patients underweight (z-score of BMI<-2): age and sex pyramids, by country and overall. Patients aged 2-17 years in 2014.

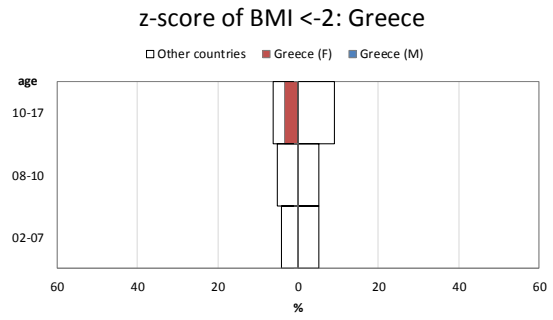
The coloured bars (red for females, blue for males) represent the percentage of underweight patients in the selected country, whereas the non-coloured bars represent the percentage of underweight patients in all the remaining countries (i.e. excluding that country). We excluded from the analyses those age groups where the number of patients was <10. We therefore excluded from the graphs Latvia, Lithuania, Republic of Moldova and Romania because some of the age groups in these countries had less than 10 patients.

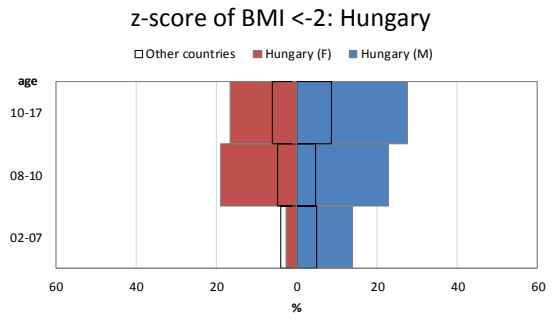




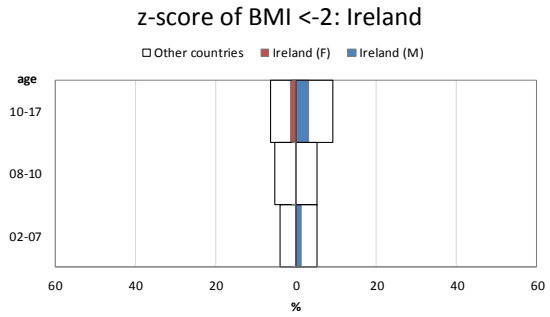


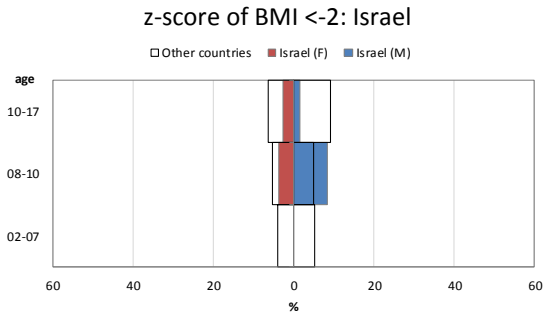


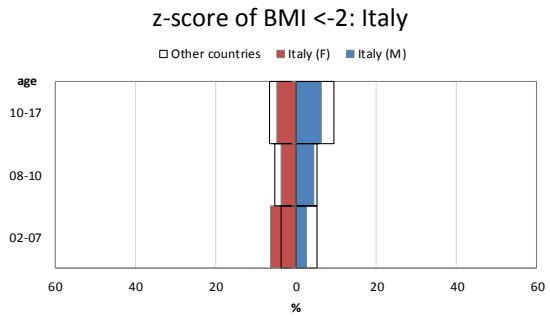


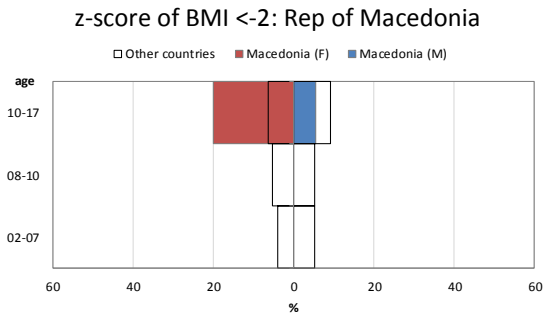


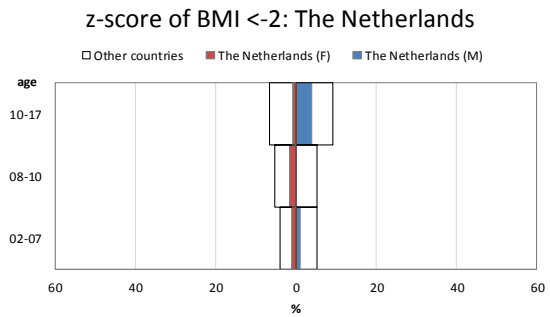
[figure 6.7 continued]

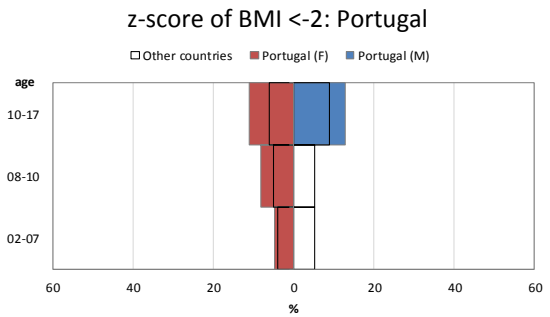


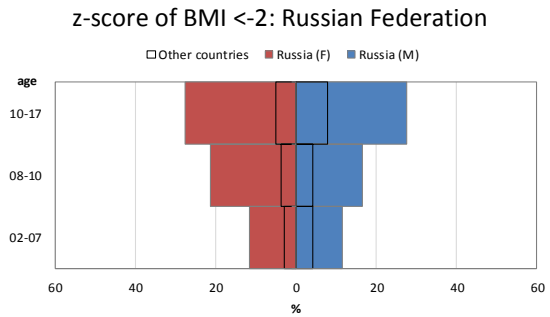


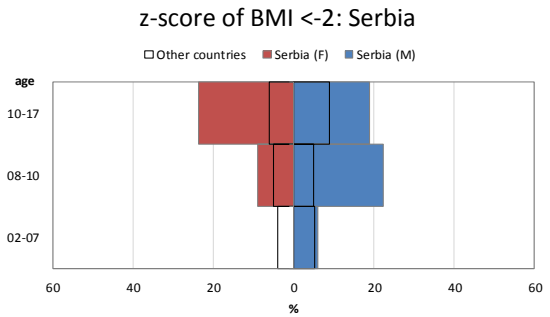




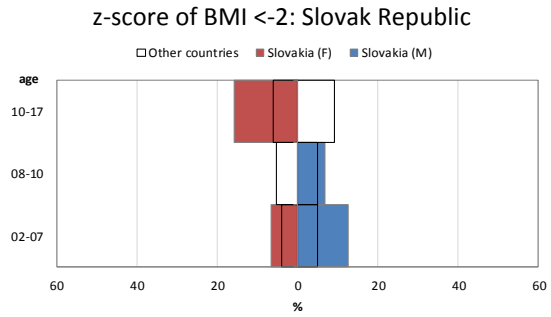


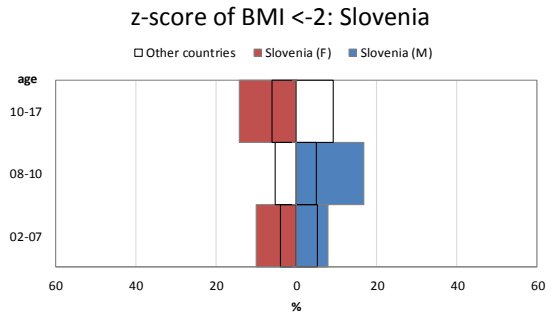


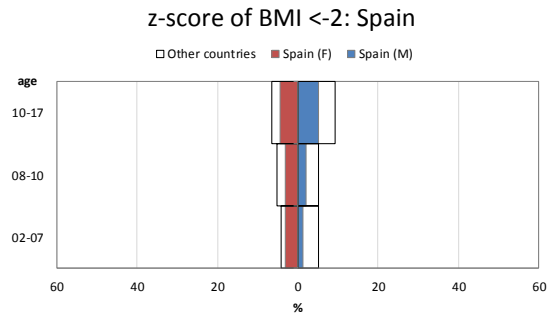


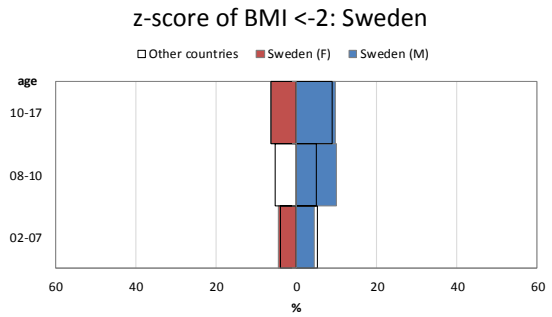


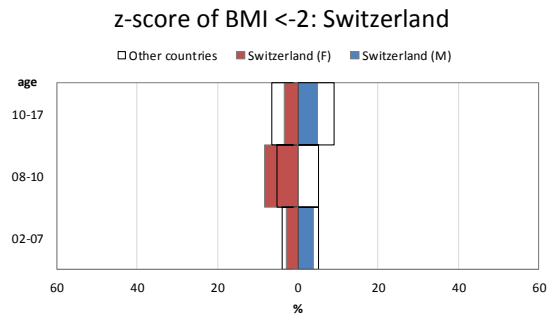
[figure 6.7 continued]

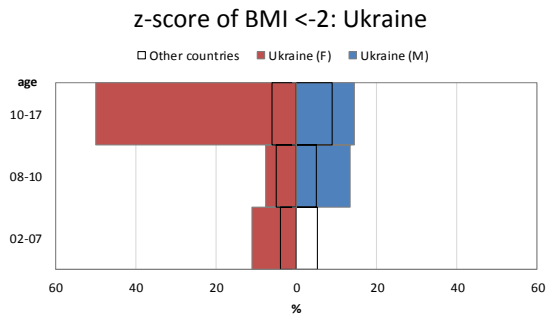












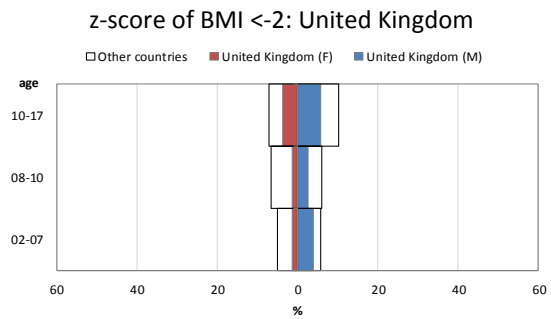
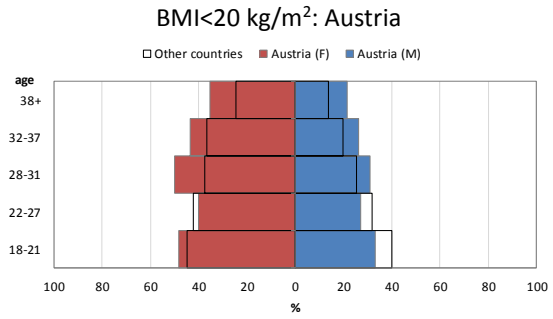
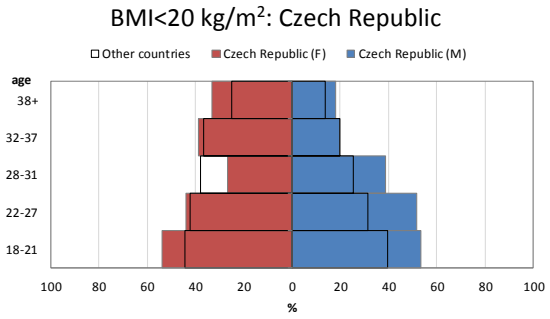
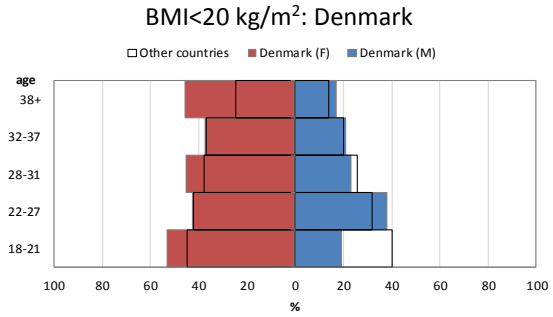


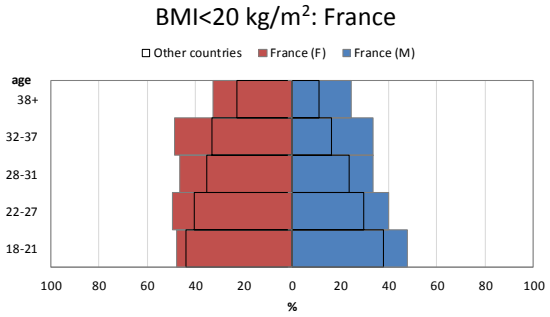
Figure 6.8 Proportion of adult patients with BMI<20: age and sex pyramids, by country and overall. Patients aged 18 years or older in 2014.

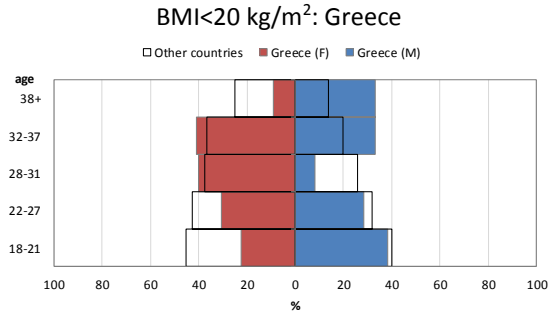
The coloured bars (red for females, blue for males) represent the percentage of patients with BMI<20 in the selected country, whereas the non-coloured bars represent the percentage of patients with BMI<20 in all the remaining countries (i.e. excluding that country). We excluded from the analyses those age groups where the number of patients was <10. We therefore excluded from the graphs Latvia, Lithuania, Republic of Moldova, Republic of Macedonia, Romania, Serbia, Slovenia and Ukraine because some of the age groups in these countries had less than 10 patients.

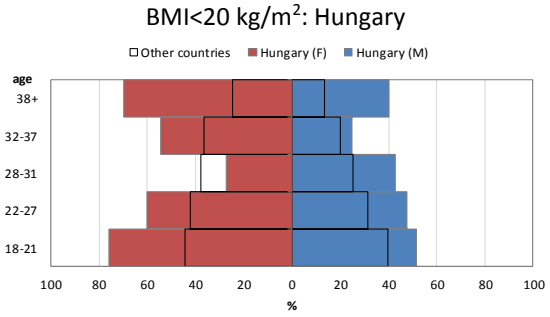




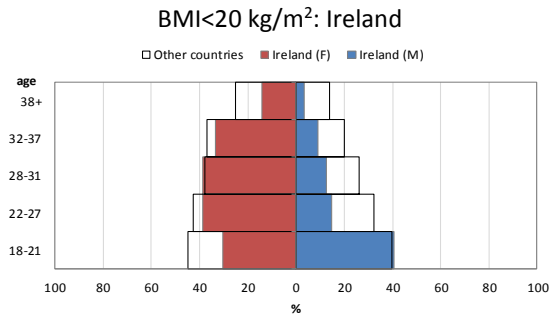


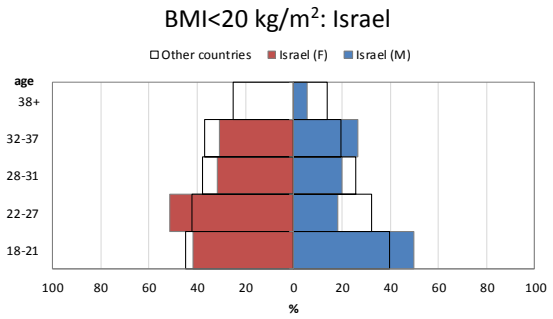


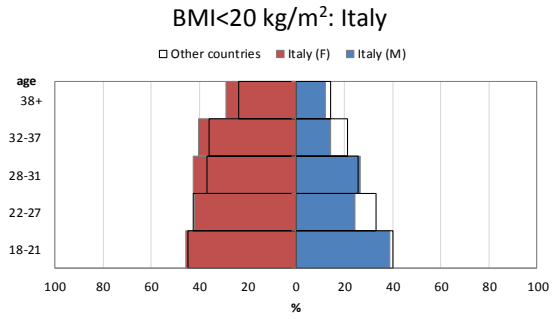


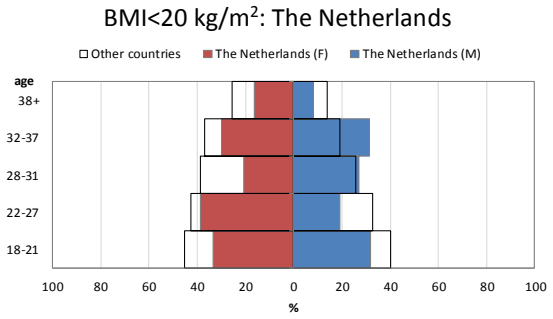


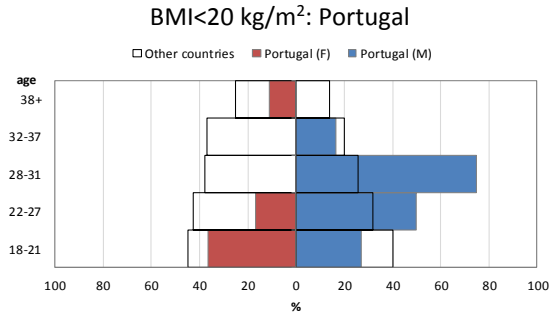
[figure 6.8 continued]

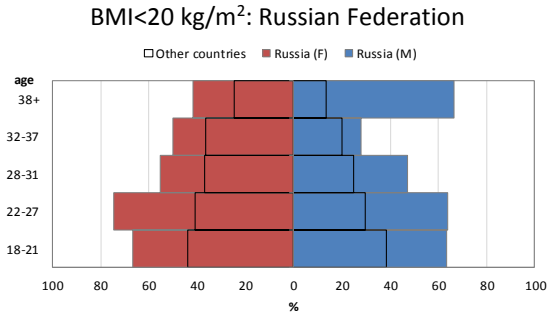






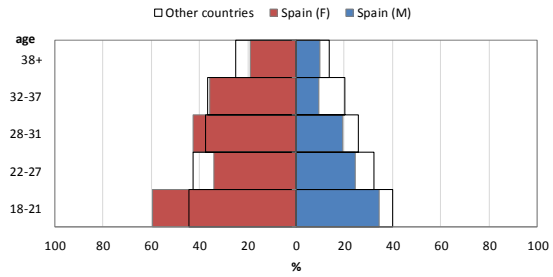




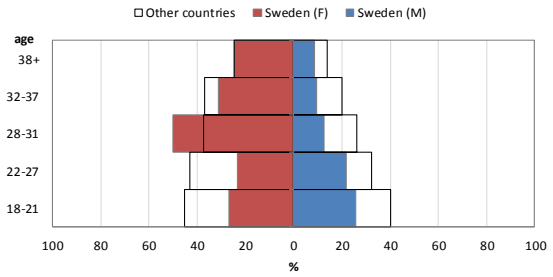


[figure 6.8 continued]

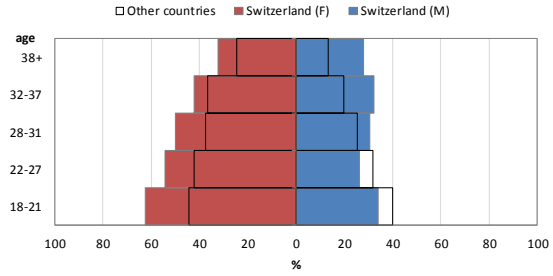
BMI<20 kg/m^2: Spain



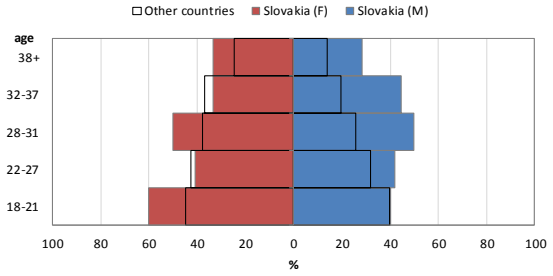
BMI<20 kg/m^2: Sweden



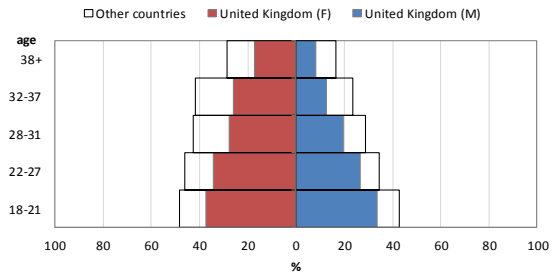
BMI<20 kg/m^2: Switzerland



BMI<20 kg/m^2: Slovak Republic



BMI<20 kg/m^2: United Kingdom



7. Complications and therapy

The information in this section should not be considered complete, either because national registries do not collect data about one or more complications, since they use a different definition or because the status of the complication is truly unknown (e.g. liver disease, where the definition requires ultrasound examination). In the tables, therefore, we show the number of missing values for the various complications, but in the graphs we have included only countries where less than 10% of the data was missing. For a full list of complications and definitions please see Appendix 2 on page 122.

In this section we also present data on selected therapies. We collected information on therapies using the generic name of the drug (i.e. not the brand name), in order to avoid data collection bias due to brand names. For example, we ask whether the patient has been taking ”inhaled antibiotics for more than three months this year”, instead of naming individual antibiotics.

Like the complications section, the information presented in the therapy section should not be considered complete, and we will show only selected results, in accordance with the same criteria used for complications.

Table 7.1 Prevalence of allergic bronchopulmonary aspergillosis (all patients seen in 2014) and CFRD treated with insulin in 2014 (patients aged 18 years or older), by country.

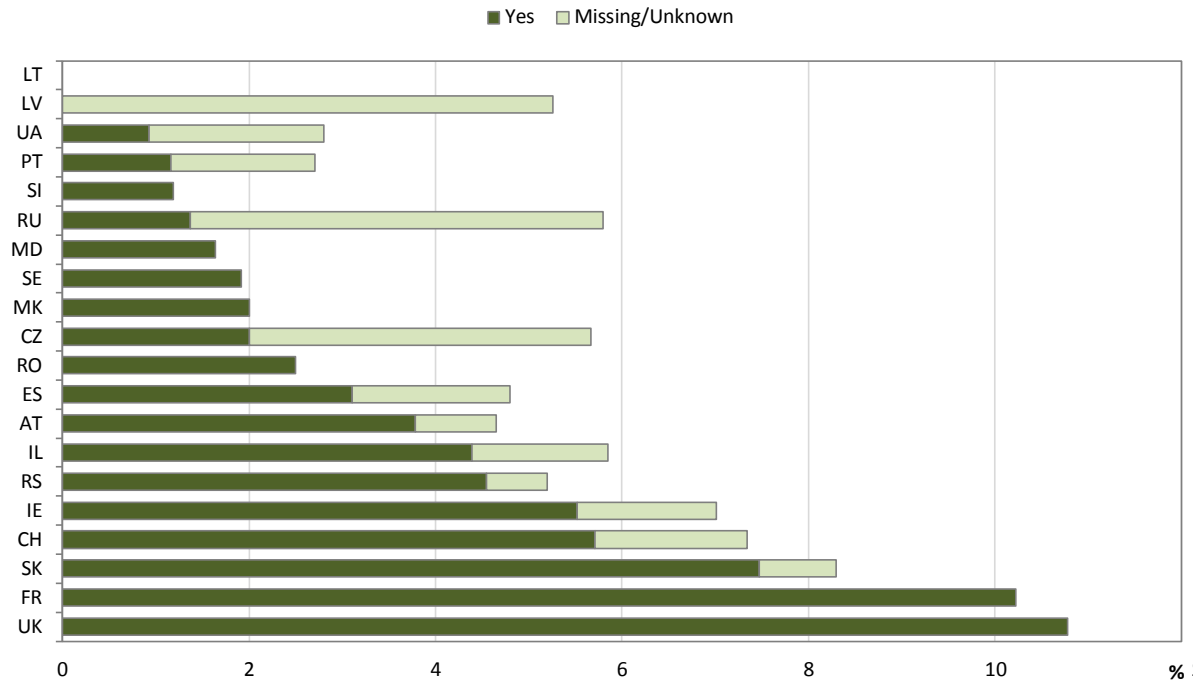
Country	ABPA this year number (%)			CF related diabetes with daily use of insulin this year number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	6 (0.87)	655 (95.34)	26 (3.78)	4 (1.27)	227 (72.06)	84 (26.67)
Czech Republic	22 (3.67)	565 (94.32)	12 (2.00)	16 (5.93)	166 (61.48)	88 (32.59)
Denmark	459 (100)	0 (0)	0 (0)	0 (0)	165 (60.44)	108 (39.56)
France[1]	0 (0)	5718 (89.78)	651 (10.22)	0 (0)	2517 (75.31)	825 (24.69)
Greece	112 (22.09)	378 (74.56)	17 (3.35)	21 (8.20)	186 (72.66)	49 (19.14)
Hungary	82 (14.72)	473 (84.92)	2 (0.36)	51 (20.48)	151 (60.64)	47 (18.88)
Ireland	14 (1.49)	876 (92.99)	52 (5.52)	11 (2.64)	290 (69.71)	115 (27.64)
Israel	8 (1.46)	515 (94.15)	24 (4.39)	7 (2.26)	216 (69.68)	87 (28.06)
Italy	1776 (35.66)	3076 (61.77)	128 (2.57)	339 (12.26)	1809 (65.42)	617 (22.31)
Latvia	2 (5.26)	36 (94.74)	0 (0)	0 (0)	8 (72.73)	3 (27.27)
Lithuania	0 (0)	12 (100)	0 (0)	0 (0)	11 (91.67)	1 (8.33)
Rep of Macedonia	0 (0)	98 (98.00)	2 (2.00)	0 (0)	20 (74.07)	7 (25.93)
Rep of Moldova	0 (0)	60 (98.36)	1 (1.64)	0 (0)	13 (92.86)	1 (7.14)
The Netherlands	164 (11.90)	1100 (79.83)	114 (8.27)	164 (21.05)	378 (48.52)	237 (30.42)
Portugal	4 (1.55)	251 (97.29)	3 (1.16)	1 (0.97)	90 (87.38)	12 (11.65)
Romania	0 (0)	39 (97.50)	1 (2.50)	-	-	-
Russian Federation	94 (4.43)	1998 (94.20)	29 (1.37)	29 (4.63)	552 (88.18)	45 (7.19)
Serbia	1 (0.65)	146 (94.81)	7 (4.55)	1 (2.17)	34 (73.91)	11 (23.91)
Slovak Republic	2 (0.83)	221 (91.70)	18 (7.47)	1 (0.83)	106 (87.6)	14 (11.57)
Slovenia	0 (0)	83 (98.81)	1 (1.19)	0 (0)	21 (80.77)	5 (19.23)
Spain	25 (1.69)	1410 (95.21)	46 (3.11)	13 (2.09)	422 (67.95)	186 (29.95)
Sweden	0 (0)	614 (98.08)	12 (1.92)	0 (0)	288 (73.47)	104 (26.53)
Switzerland	12 (1.63)	682 (92.66)	42 (5.71)	5 (1.41)	265 (74.86)	84 (23.73)
Ukraine	2 (1.87)	104 (97.20)	1 (0.93)	0 (0)	12 (92.31)	1 (7.69)
United Kingdom	0 (0)	8413 (89.22)	1017 (10.78)	0 (0)	3454 (66.28)	1757 (33.72)

[1] France: ABPA was collected as: Aspergillosis (ABPA and other) if treated.

Note: Romania has only one adult patient and therefore no information is included for CFRD.

Table 7.1 shows the frequency of allergic bronchopulmonary aspergillosis (see Appendix 2, page 122, for ABPA definitions) and CF-related diabetes (CFRD), defined here as treated daily with insulin, by country. For CFRD only patients 18 years or older are included.

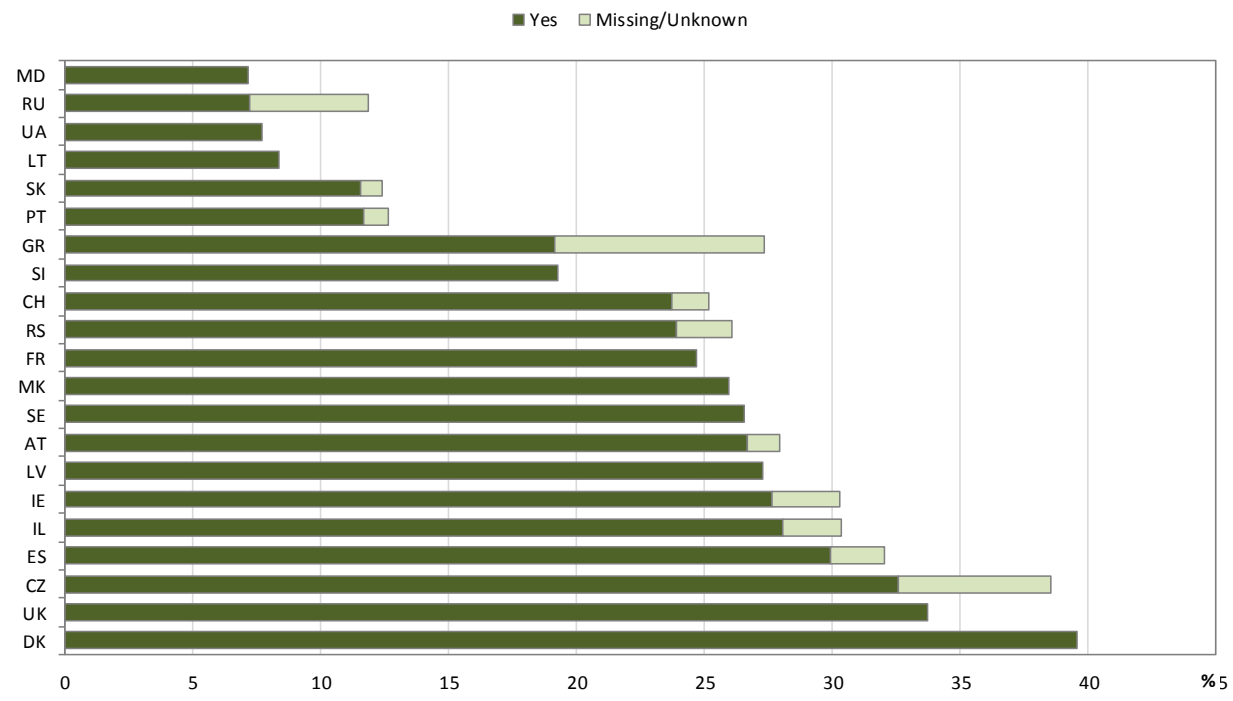
Figure 7.1 Prevalence of allergic bronchopulmonary aspergillosis in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on allergic bronchopulmonary aspergillosis (ABPA) was missing for more than 10% of the patients.
Note: France collected ABPA as Aspergillosis (ABPA and other) if treated.

This graph shows the frequency of allergic bronchopulmonary aspergillosis by country. For the definition of ABPA see Appendix 2 (page 122). The dark green part of the bar shows the percentage of patients with ABPA, the light green part shows the percentage of patients for which this information was missing.

Figure 7.2 Prevalence of CFRD requiring daily insulin treatment, by country. All patients seen in 2014 aged 18 years or older.



Note: We excluded from the graph the countries for which the information on CFRD was missing for more than 10% of the patients. Romania has one adult patient and is excluded from the graph.

This graph shows the prevalence of CF-related diabetes (CFRD) by country. CFRD is recorded differently among the national registries. As a substitute marker of diabetes we have collected data on the use of insulin on a daily basis. The dark green part of the bar shows the percentage of patients who use insulin daily, the light green part shows the percentage of patients for whom this information was missing. Only patients aged 18 years or older were included in this graph.

Table 7.2 Prevalence of pneumothorax, haemoptysis and malignancy in all patients seen in 2014, by country.

Country	Pneumothorax requiring chest tube this year number (%)			Haemoptysis major over 250 ml this year number (%)			Malignancy occurred this year number(%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	4 (0.58)	680 (98.98)	3 (0.44)	20 (2.91)	646 (94.03)	21 (3.06)	7 (1.02)	677 (98.54)	3 (0.44)
Czech Republic	22 (3.67)	571 (95.33)	6 (1.00)	23 (3.84)	571 (95.33)	5 (0.83)	22 (3.67)	577 (96.33)	0 (0)
Denmark	0 (0)	457 (99.56)	2 (0.44)	459 (100)	0 (0)	0 (0)	0 (0)	458 (99.78)	1 (0.22)
France[1]	0 (0)	6328 (99.36)	41 (0.64)	0 (0)	6053 (95.04)	316 (4.96)	0 (0)	6343 (99.59)	26 (0.41)
Greece	94 (18.54)	407 (80.28)	6 (1.18)	96 (18.93)	401 (79.09)	10 (1.97)	95 (18.74)	412 (81.26)	0 (0)
Hungary	92 (16.52)	456 (81.87)	9 (1.62)	124 (22.26)	424 (76.12)	9 (1.62)	112 (20.11)	442 (79.35)	3 (0.54)
Ireland	14 (1.49)	922 (97.88)	6 (0.64)	14 (1.49)	927 (98.41)	<5 (0.11)	14 (1.49)	924 (98.09)	<5 (0.42)
Israel	10 (1.83)	533 (97.44)	4 (0.73)	9 (1.65)	519 (94.88)	19 (3.47)	11 (2.01)	536 (97.99)	0 (0)
Italy	967 (19.42)	4001 (80.34)	12 (0.24)	974 (19.56)	3953 (79.38)	53 (1.06)	969 (19.46)	3993 (80.18)	18 (0.36)
Latvia	1 (2.63)	37 (97.37)	0 (0)	1 (2.63)	37 (97.37)	0 (0)	1 (2.63)	37 (97.37)	0 (0)
Lithuania	0 (0)	12 (100)	0 (0)	0 (0)	12 (100)	0 (0)	0 (0)	12 (100)	0 (0)
Rep of Macedonia	0 (0)	100 (100)	0 (0)	0 (0)	97 (97.00	3 (3.00)	0 (0)	100 (100)	0 (0)
Rep of Moldova	0 (0)	61 (100)	0 (0)	0 (0)	56 (91.80)	5 (8.20)	0 (0)	60 (98.36)	1 (1.64)
The Netherlands[2]	171 (12.41)	1201 (87.16)	6 (0.44)	171 (12.41)	1146 (83.16)	61 (4.43)	0 (0)	1368 (99.27)	10 (0.73)
Portugal	3 (1.16)	255 (98.84)	0 (0)	6 (2.33)	236 (91.47)	16 (6.20)	3 (1.16)	255 (98.84)	0 (0)
Romania	0 (0)	40 (100)	0 (0)	0 (0)	39 (97.50)	1 (2.50)	0 (0)	40 (100)	0 (0)
Russian Federation	56 (2.64)	2048 (96.56)	17 (0.80)	69 (3.25)	2026 (95.52)	26 (1.23)	57 (2.69)	2059 (97.08)	5 (0.24)
Serbia	1 (0.65)	153 (99.35)	0 (0)	1 (0.65)	148 (96.1)	5 (3.25)	1 (0.65)	153 (99.35)	0 (0)
Slovak Republic	2 (0.83)	239 (99.17)	0 (0)	3 (1.24)	217 (90.04)	21 (8.71)	2 (0.83)	239 (99.17)	0 (0)
Slovenia	0 (0)	84 (100)	0 (0)	0 (0)	84 (100)	0 (0)	0 (0)	84 (100)	0 (0)
Spain	26 (1.76)	1449 (97.84)	6 (0.41)	28 (1.89)	1383 (93.38)	70 (4.73)	25 (1.69)	1442 (97.37)	14 (0.95)
Sweden	0 (0)	623 (99.52)	3 (0.48)	0 (0)	626 (100)	0 (0)	0 (0)	622 (99.36)	4 (0.64)
Switzerland	9 (1.22)	725 (98.51)	2 (0.27)	13 (1.77)	692 (94.02)	31 (4.21)	8 (1.09)	725 (98.51)	3 (0.41)
Ukraine	2 (1.87)	104 (97.2)	1 (0.93)	2 (1.87)	103 (96.26)	2 (1.87)	2 (1.87)	105 (98.13)	0 (0)
United Kingdom	0 (0)	9363 (99.29)	67 (0.71)	0 (0)	9395 (99.63)	35 (0.37)	0 (0)	9397 (99.65)	33 (0.35)

[1] France: pneumothorax only; haemoptysis, no quantification.

[2] The Netherlands: malignancy diagnosed this year or in the past.

Table 7.2, previous page, shows the frequency of three rare complications: Pneumothorax (collapsed lung) requiring chest tube, haemoptysis (coughing up of blood) of more than 250 ml and occurrence of malignancy (cancer). All these complications are extremely rare.

Table 7.3 Prevalence of liver disease and use of ursodeoxycholic acid in all patients seen in 2014, by country.

Country	Liver disease this year number (%)						Ursodeoxycholic acid this year number (%)		
	Missing/ unknown	No liver disease	Cirrhosis			Liver disease without cirrhosis	Missing/ unknown	No	Yes
			Cirrhosis with portal hypertension/ hypersplenism	Cirrhosis no portal hypertension/ hypersplenism	Cirrhosis, portal hypertension unknown				
Austria	9 (1.31)	421 (61.28)	42 (6.11)	13 (1.89)	2 (0.29)	200 (29.11)	5 (0.73)	348 (50.66)	334 (48.62)
Czech Republic	193 (32.22)	252 (42.07)	5 (0.83)	11 (1.84)	0 (0)	138 (23.04)	22 (3.67)	360 (60.10)	217 (36.23)
Denmark	35 (7.63)	368 (80.17)	6 (1.31)	3 (0.65)	15 (3.27)	32 (6.97)	0 (0)	352 (76.69)	107 (23.31)
France[1]	0 (0)	6097 (95.73)	0 (0)	0 (0)	272 (4.27)	0 (0)	0 (0)	4287 (67.31)	2082 (32.69)
Greece	103 (20.32)	309 (60.95)	33 (6.51)	9 (1.78)	9 (1.78)	44 (8.68)	94 (18.54)	311 (61.34)	102 (20.12)
Hungary	91 (16.34)	315 (56.55)	63 (11.31)	11 (1.97)	53 (9.52)	24 (4.31)	60 (10.77)	305 (54.76)	192 (34.47)
Ireland[2]	14 (1.49)	808 (85.77)	34 (3.61)	<5 (0.11)	<5 (0.21)	83 (8.81)	14 (1.49)	827 (87.79)	101 (10.72)
Israel	10 (1.83)	444 (81.17)	18 (3.29)	4 (0.73)	0 (0)	71 (12.98)	6 (1.10)	436 (79.71)	105 (19.2)
Italy	968 (19.44)	2978 (59.80)	50 (1.00)	49 (0.98)	4 (0.08)	931 (18.69)	976 (19.60)	2551 (51.22)	1453 (29.18)
Latvia	1 (2.63)	13 (34.21)	1 (2.63)	0 (0)	0 (0)	23 (60.53)	1 (2.63)	16 (42.11)	21 (55.26)
Lithuania	0 (0)	12 (100)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	12 (100)	0 (0)
Rep of Macedonia	0 (0)	50 (50.00)	4 (4.00)	15 (15.00)	0 (0)	31 (31.00)	0 (0)	50 (50.00)	50 (50.00)
Rep of Moldova	0 (0)	60 (98.36)	1 (1.64)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	61 (100)
The Netherlands	190 (13.79)	939 (68.14)	64 (4.64)	20 (1.45)	163 (11.83)	2 (0.15)	5 (0.36)	989 (71.77)	384 (27.87)
Portugal	7 (2.71)	196 (75.97)	3 (1.16)	0 (0)	0 (0)	52 (20.16)	1 (0.39)	179 (69.38)	78 (30.23)
Romania	0 (0)	34 (85.00)	0 (0)	0 (0)	0 (0)	6 (15.00)	0 (0)	37 (92.50)	3 (7.50)
Russian Federation	74 (3.49)	1443 (68.03)	78 (3.68)	80 (3.77)	4 (0.19)	442 (20.84)	54 (2.55)	178 (8.39)	1889 (89.06)

[1] France: collects cirrhosis/liver disease *yes* or *no* – these have been pooled under cirrhosis, portal hypertension unknown.

[2] Ireland: when the number of patients is less than 5 the information is suppressed.

[table 7.3 continued]

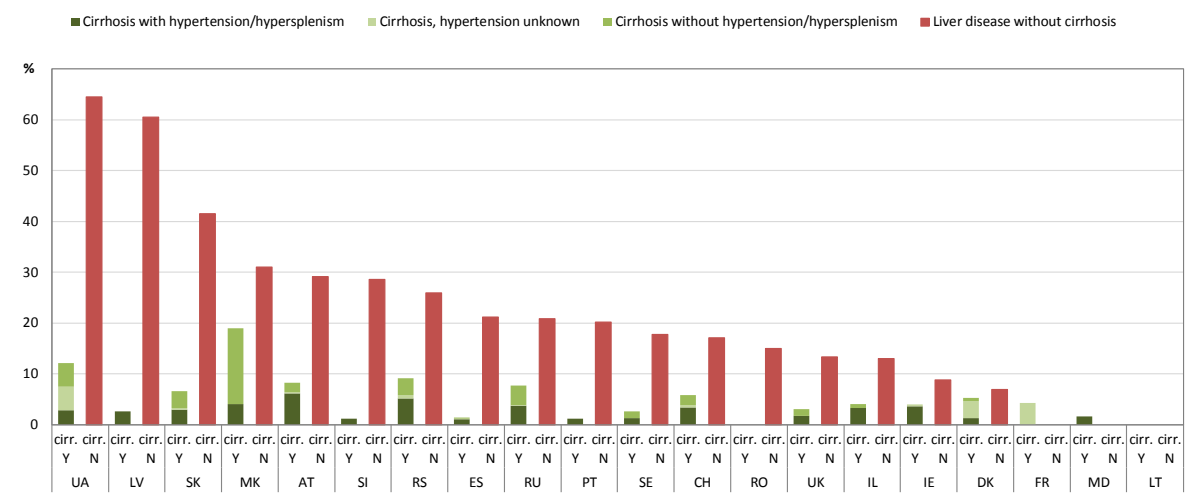
Country	Liver disease this year number (%)						Ursodeoxycholic acid this year number (%)		
	Missing/ unknown	No liver disease	Cirrhosis			Liver disease without cirrhosis	Missing/ unknown	No	Yes
			Cirrhosis with portal hypertension/ hypersplenism	Cirrhosis no portal hypertension/ hypersplenism	Cirrhosis, portal hypertension unknown				
Serbia[1]	2 (1.3)	98 (63.64)	8 (5.19)	5 (3.25)	1 (0.65)	40 (25.97)	1 (0.65)	99 (64.29)	54 (35.06)
Slovak Republic	3 (1.24)	122 (50.62)	7 (2.90)	8 (3.32)	1 (0.41)	100 (41.49)	2 (0.83)	126 (52.28)	113 (46.89)
Slovenia	0 (0)	59 (70.24)	1 (1.19)	0 (0)	0 (0)	24 (28.57)	1 (1.19)	33 (39.29)	50 (59.52)
Spain	26 (1.76)	1122 (75.76)	16 (1.08)	3 (0.20)	1 (0.07)	313 (21.13)	27 (1.82)	1102 (74.41)	352 (23.77)
Sweden[2]	1 (0.16)	498 (79.55)	8 (1.28)	8 (1.28)	0 (0)	111 (17.73)	23 (3.67)	463 (73.96)	140 (22.36)
Switzerland	38 (5.16)	529 (71.88)	25 (3.40)	15 (2.04)	3 (0.41)	126 (17.12)	9 (1.22)	508 (69.02)	219 (29.76)
Ukraine	2 (1.87)	23 (21.50)	3 (2.80)	5 (4.67)	5 (4.67)	69 (64.49)	3 (2.80)	3 (2.80)	101 (94.39)
United Kingdom	0 (0)	7889 (83.66)	158 (1.68)	126 (1.34)	0 (0)	1257 (13.33)	107 (1.13)	7367 (78.12)	1956 (20.74)

[1] Serbia: cirrhosis without portal hypertension/hypersplenism means the presence of CF-related liver disease with normal liver function.

[2] Sweden: has only collected cirrhosis with portal hypertension *yes* or *no* this year. The rest have been set to No liver disease due to software issues. The prevalence of use of ursodeoxycholic acid could be used as an indicator of the total prevalence of liver disease of all categories.

This table shows the frequency and severity of liver disease according to the ECFSPR definitions (see Appendix 2, page 122) and use of ursodeoxycholic acid, a commonly used treatment for CF liver disease. The frequency and severity of liver disease differs greatly, and does not correspond to the number of patients on ursodeoxycholic acid.

Figure 7.3 Prevalence and severity of liver disease in all patients seen in 2014, by country.

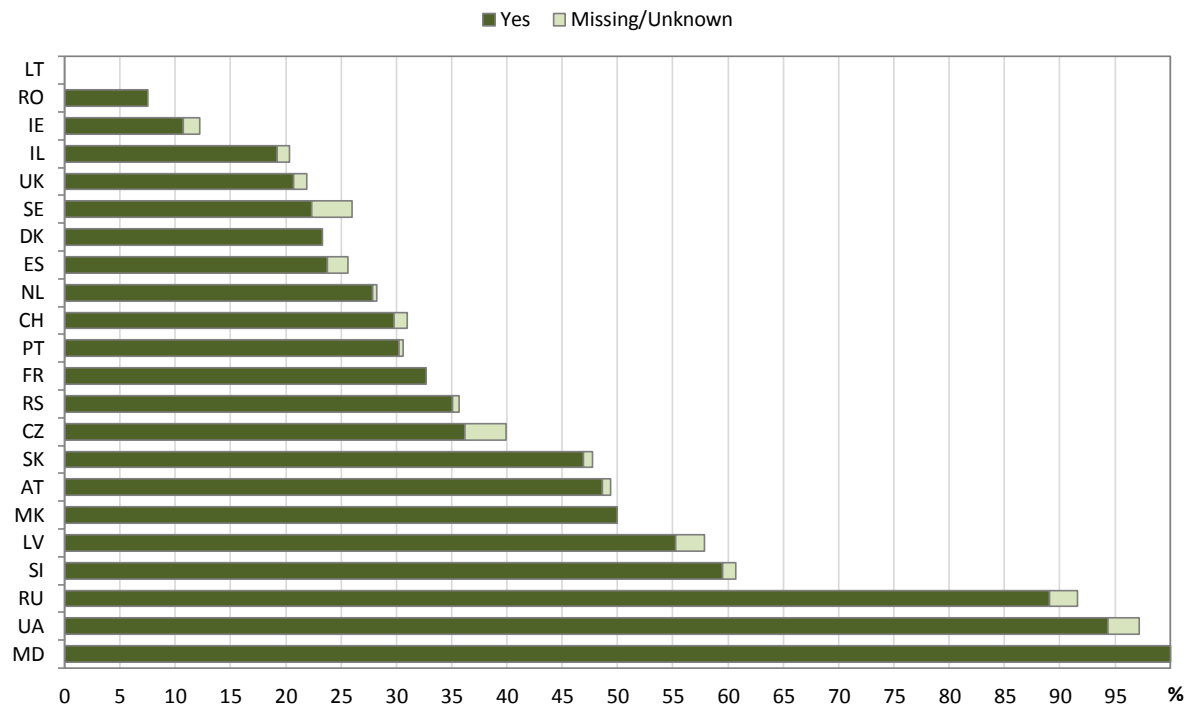


Note: We excluded from the graph the countries for which the information on liver disease was missing for more than 10% of the patients.

Note: France: collects cirrhosis/liver disease *yes* or *no* – these have been pooled under cirrhosis, portal hypertension unknown.
Serbia: cirrhosis without portal hypertension/hypersplenism means the presence of CF-related disease with normal liver function.
Sweden: has only collected cirrhosis with portal hypertension *yes* or *no* this year. The rest have been set to No liver disease due to software issues. The prevalence of use of ursodeoxycholic acid could be used as an indicator of the total amount of liver disease of all categories.

This graph shows the frequency of liver disease by country. Liver disease is defined according to severity of portal hypertension (increased blood pressure in the liver veins, often resulting in blood shunting past the cirrhotic liver), divided into five categories, including no liver disease (see Appendix 2, page 122). This graph emphasises better than the table the vast differences in frequency and severity, which may be due to problems in definitions and diagnostic tools.

Figure 7.4 Use of ursodeoxycholic acid in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on ursodeoxycholic acid was missing for more than 10% of the patients.

This graph shows how many patients used ursodeoxycholic acid during the survey year. Ursodeoxycholic acid is used as a treatment for CF liver disease. The dark green part of the bar indicates the percentage of patients taking this drug, the light green part shows the percentage of patients for whom this information is missing.

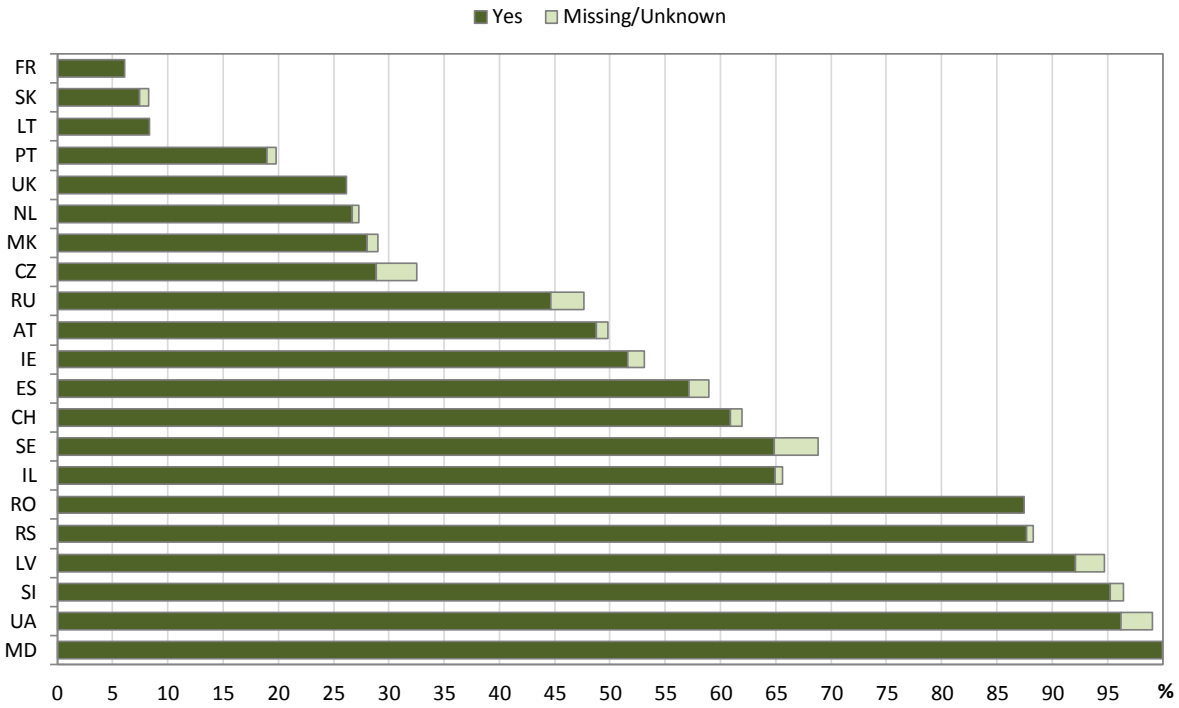
Table 7.4 Use of hypertonic saline, rhDNase and bronchodilators in all patients seen in 2014, by country.

Country	Hypertonic saline (NaCl) inhaled > 3 months this year number (%)			rhDNase inhaled > 3 months this year number (%)			Bronchodilators inhaled > 3 months this year number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	7 (1.02)	345 (50.22)	335 (48.76)	7 (1.02)	331 (48.18)	349 (50.80)	6 (0.87)	89 (12.95)	592 (86.17)
Czech Republic	22 (3.67)	404 (67.45)	173 (28.88)	22 (3.67)	226 (37.73)	351 (58.60)	22 (3.67)	282 (47.08)	295 (49.25)
Denmark	459 (100)	0 (0)	0 (0)	0 (0)	60 (13.07)	399 (86.93)	459 (100)	0 (0)	0 (0)
France	0 (0)	5981 (93.91)	388 (6.09)	0 (0)	3263 (51.23)	3106 (48.77)	0 (0)	3183 (49.98)	3186 (50.02)
Greece	92 (18.15)	310 (61.14)	105 (20.71)	95 (18.74)	200 (39.45)	212 (41.81)	92 (18.15)	221 (43.59)	194 (38.26)
Hungary	74 (13.29)	164 (29.44)	319 (57.27)	66 (11.85)	230 (41.29)	261 (46.86)	75 (13.46)	214 (38.42)	268 (48.11)
Ireland	14 (1.49)	442 (46.92)	486 (51.59)	14 (1.49)	299 (31.74)	629 (66.77)	14 (1.49)	326 (34.61)	602 (63.91)
Israel	4 (0.73)	188 (34.37)	355 (64.90)	7 (1.28)	189 (34.55)	351 (64.17)	5 (0.91)	194 (35.47)	348 (63.62)
Italy	1718 (34.50)	2029 (40.74)	1233 (24.76)	979 (19.66)	2721 (54.64)	1280 (25.70)	1714 (34.42)	963 (19.34)	2303 (46.24)
Latvia	1 (2.63)	2 (5.26)	35 (92.11)	1 (2.63)	7 (18.42)	30 (78.95)	1 (2.63)	3 (7.89)	34 (89.47)
Lithuania	0 (0)	11 (91.67)	1 (8.33)	0 (0)	0 (0)	12 (100)	0 (0)	1 (8.33)	11 (91.67)
Rep of Macedonia	1 (1.00)	71 (71.00)	28 (28.00)	0 (0)	29 (29.00)	71 (71.00)	0 (0)	4 (4.00)	96 (96.00)
Rep of Moldova	0 (0)	0 (0)	61 (100)	0 (0)	61 (100)	0 (0)	0 (0)	0 (0)	61 (100)
The Netherlands	8 (0.58)	1002 (72.71)	368 (26.71)	6 (0.44)	552 (40.06)	820 (59.51)	5 (0.36)	770 (55.88)	603 (43.76)
Portugal	2 (0.78)	207 (80.23)	49 (18.99)	4 (1.55)	69 (26.74)	185 (71.71)	2 (0.78)	134 (51.94)	122 (47.29)
Romania	0 (0)	5 (12.50)	35 (87.50)	0 (0)	12 (30.00)	28 (70.00)	0 (0)	5 (12.50)	35 (87.50)
Russian Federation	64 (3.02)	1110 (52.33)	947 (44.65)	44 (2.07)	142 (6.69)	1935 (91.23)	71 (3.35)	693 (32.67)	1357 (63.98)
Serbia	1 (0.65)	18 (11.69)	135 (87.66)	1 (0.65)	82 (53.25)	71 (46.10)	1 (0.65)	1 (0.65)	152 (98.70)
Slovak Republic	2 (0.83)	221 (91.70)	18 (7.47)	2 (0.83)	90 (37.34)	149 (61.83)	4 (1.66)	113 (46.89)	124 (51.45)
Slovenia	1 (1.19)	3 (3.57)	80 (95.24)	0 (0)	53 (63.10)	31 (36.90)	2 (2.38)	71 (84.52)	11 (13.10)
Spain	27 (1.82)	608 (41.05)	846 (57.12)	26 (1.76)	1175 (79.34)	280 (18.91)	26 (1.76)	418 (28.22)	1037 (70.02)
Sweden	25 (3.99)	195 (31.15)	406 (64.86)	25 (3.99)	462 (73.80)	139 (22.20)	24 (3.83)	65 (10.38)	537 (85.78)
Switzerland	8 (1.09)	280 (38.04)	448 (60.87)	6 (0.82)	449 (61.01)	281 (38.18)	8 (1.09)	75 (10.19)	653 (88.72)
Ukraine	3 (2.80)	1 (0.93)	103 (96.26)	9 (8.41)	66 (61.68)	32 (29.91)	3 (2.80)	35 (32.71)	69 (64.49)
United Kingdom[1]	0 (0)	6964 (73.85)	2466 (26.15)	0 (0)	4288 (45.47)	5142 (54.53)	0 (0)	4483 (47.54)	4947 (52.46)

[1] United Kingdom: the duration of use of inhaled hypertonic saline and of bronchodilators is not specified.

Table 7.4 shows the use of three different inhaled medications: hypertonic saline, rhDNase (Pulmozyme®) and bronchodilators (see page 14 for abbreviations). All of these medications are widely used, but still with marked differences among the countries.

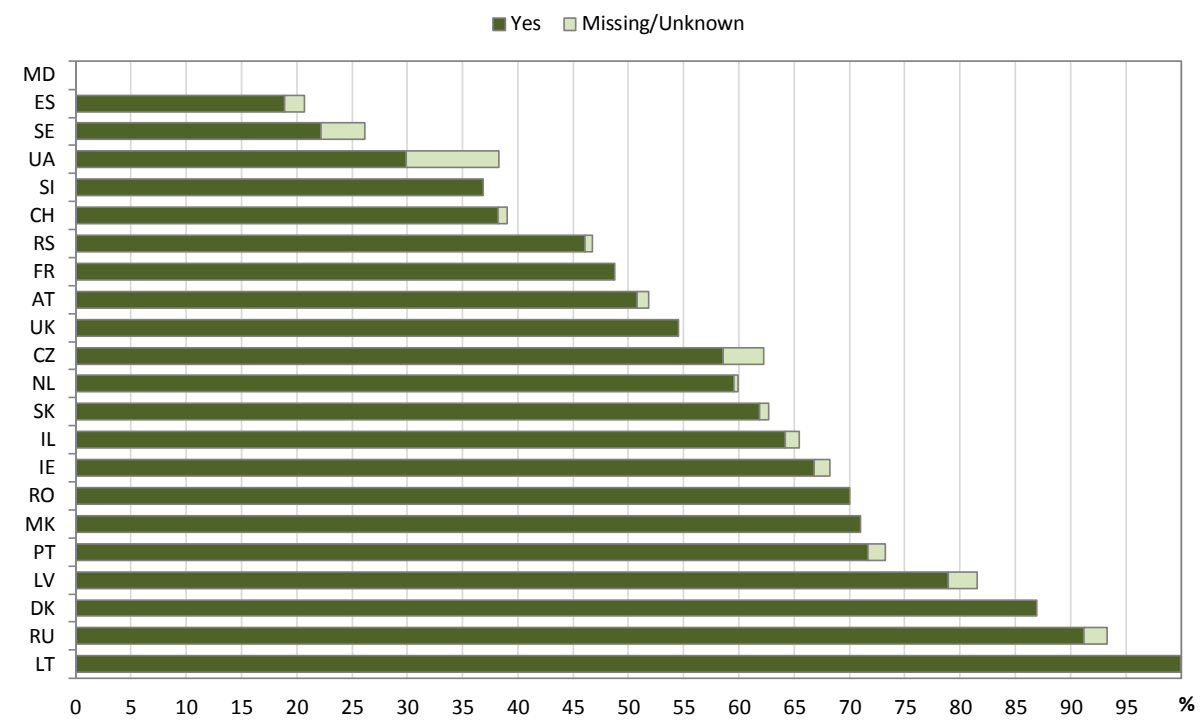
Figure 7.5 Use of inhaled hypertonic saline in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on inhaled hypertonic saline was missing for more than 10% of the patients.
Note: United Kingdom: the duration of use of inhaled hypertonic saline is not specified.

This table shows the use of inhaled hypertonic saline for more than three months during the survey year. The dark green part of the bar indicates the percentage of patients taking the medication, the light green part shows the percentage of patients for whom this information is missing.

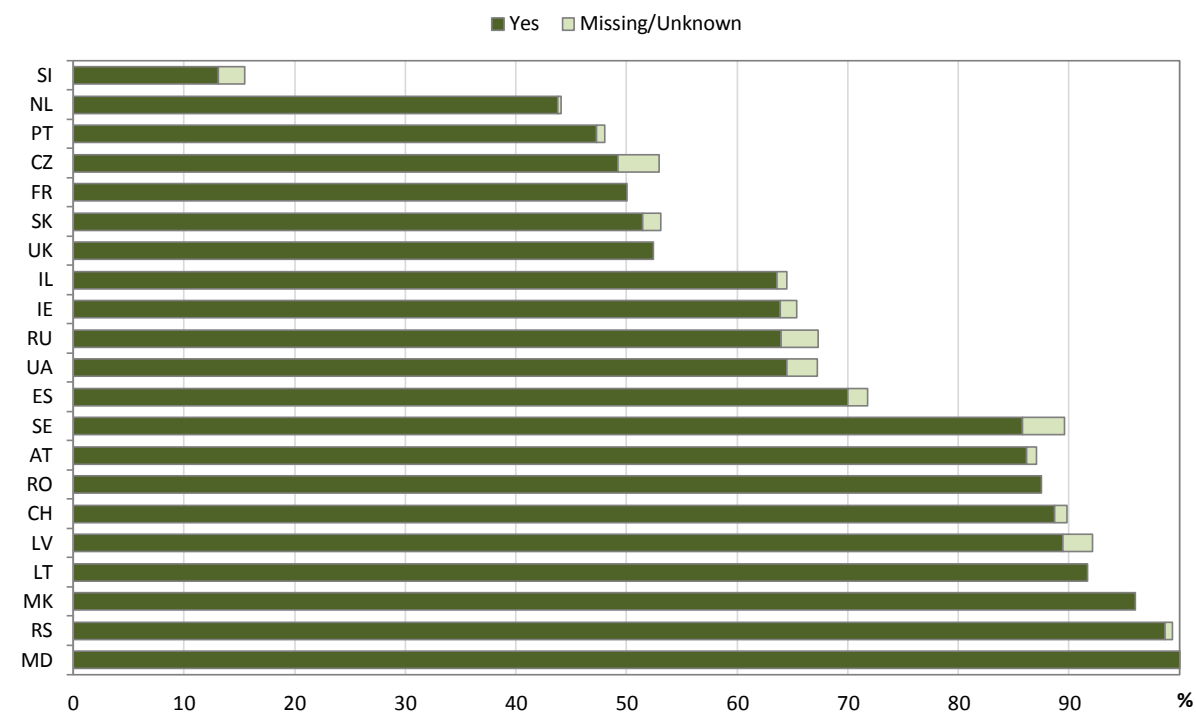
Figure 7.6 Use of rhDNase in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on rhDNase was missing for more than 10% of the patients.

This graph shows the use of rhDNase (marketed as Pulmozyme®) as inhalations for more than three months during the survey year. The dark green part of the bar indicates the percentage of patients taking this drug, the light green part shows the percentage of patients for whom this information is missing.

Figure 7.7 Use of bronchodilators in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on use of bronchodilators was missing for more than 10% of the patients.
Note: United Kingdom: the duration of use of bronchodilators is not specified.

This graph shows the use of bronchodilators for more than three months during the survey year. This is the most widely used inhaled medication, but still there are large differences in frequency of use between countries. The dark green part of the bar indicates the percentage of patients taking these drug, the light green part shows the percentage of patients for whom this information is missing.

Table 7.5 Use of inhaled antibiotics, macrolides and oxygen in all patients seen in 2014, by country.

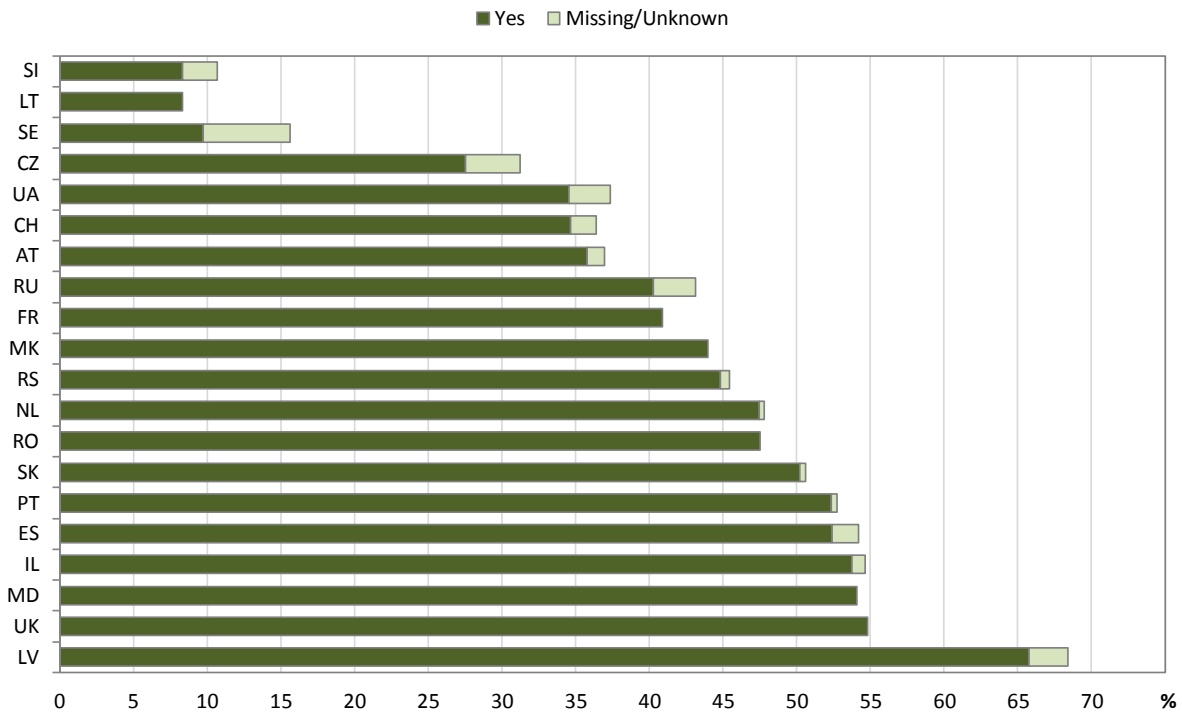
Country	Inhaled antibiotics inhaled > 3 months this year number (%)			Oxygen therapy this year number (%)			Macrolides > 3 months this year number (%)		
	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes	Missing/ unknown	No	Yes
Austria	8 (1.16)	433 (63.03)	246 (35.81)	6 (0.87)	648 (94.32)	33 (4.80)	6 (0.87)	609 (88.65)	72 (10.48)
Czech Republic	22 (3.67)	412 (68.78)	165 (27.55)	22 (3.67)	554 (92.49)	23 (3.84)	22 (3.67)	488 (81.47)	89 (14.86)
Denmark	459 (100)	0 (0)	0 (0)	459 (100)	0 (0)	0 (0)	459 (100)	0 (0)	0 (0)
France[1]	0 (0)	3764 (59.10)	2605 (40.90)	0 (0)	6072 (95.34)	297 (4.66)	0 (0)	3559 (55.88)	2810 (44.12)
Greece	91 (17.95)	169 (33.33)	247 (48.72)	91 (17.95)	396 (78.11)	20 (3.94)	93 (18.34)	339 (66.86)	75 (14.79)
Hungary	74 (13.29)	278 (49.91)	205 (36.80)	66 (11.85)	442 (79.35)	49 (8.80)	59 (10.59)	360 (64.63)	138 (24.78)
Ireland	109 (11.57)	434 (46.07)	399 (42.36)	14 (1.49)	881 (93.52)	47 (4.99)	63 (6.69)	478 (50.74)	401 (42.57)
Israel	5 (0.91)	248 (45.34)	294 (53.75)	5 (0.91)	530 (96.89)	12 (2.19)	7 (1.28)	249 (45.52)	291 (53.20)
Italy	977 (19.62)	2564 (51.49)	1439 (28.90)	976 (19.60)	3765 (75.60)	239 (4.80)	976 (19.60)	2668 (53.57)	1336 (26.83)
Latvia	1 (2.63)	12 (31.58)	25 (65.79)	1 (2.63)	33 (86.84)	4 (10.53)	1 (2.63)	26 (68.42)	11 (28.95)
Lithuania	0 (0)	11 (91.67)	1 (8.33)	0 (0)	10 (83.33)	2 (16.67)	0 (0)	12 (100)	0 (0)
Rep of Macedonia	0 (0)	56 (56.00)	44 (44.00)	0 (0)	98 (98.00)	2 (2.00)	0 (0)	77 (77.00)	23 (23.00)
Rep of Moldova	0 (0)	28 (45.90)	33 (54.10)	0 (0)	59 (96.72)	2 (3.28)	0 (0)	23 (37.70)	38 (62.30)
The Netherlands	5 (0.36)	719 (52.18)	654 (47.46)	5 (0.36)	1315 (95.43)	58 (4.21)	5 (0.36)	716 (51.96)	657 (47.68)
Portugal	1 (0.39)	122 (47.29)	135 (52.33)	1 (0.39)	239 (92.64)	18 (6.98)	3 (1.16)	150 (58.14)	105 (40.70)
Romania	0 (0)	21 (52.50)	19 (47.50)	0 (0)	39 (97.50)	1 (2.50)	0 (0)	36 (90.00)	4 (10.00)
Russian Federation	61 (2.88)	1206 (56.86)	854 (40.26)	61 (2.88)	1964 (92.60)	96 (4.53)	60 (2.83)	1393 (65.68)	668 (31.49)
Serbia	1 (0.65)	84 (54.55)	69 (44.81)	1 (0.65)	148 (96.10)	5 (3.25)	1 (0.65)	137 (88.96)	16 (10.39)
Slovak Republic	1 (0.41)	119 (49.38)	121 (50.21)	1 (0.41)	235 (97.51)	5 (2.07)	1 (0.41)	163 (67.63)	77 (31.95)
Slovenia	2 (2.38)	75 (89.29)	7 (8.33)	0 (0)	82 (97.62)	2 (2.38)	1 (1.19)	79 (94.05)	4 (4.76)
Spain	27 (1.82)	678 (45.78)	776 (52.40)	27 (1.82)	1399 (94.46)	55 (3.71)	28 (1.89)	890 (60.09)	563 (38.01)
Sweden	37 (5.91)	528 (84.35)	61 (9.74)	23 (3.67)	591 (94.41)	12 (1.92)	22 (3.51)	397 (63.42)	207 (33.07)
Switzerland	13 (1.77)	468 (63.59)	255 (34.65)	6 (0.82)	705 (95.79)	25 (3.40)	5 (0.68)	523 (71.06)	208 (28.26)
Ukraine	3 (2.80)	67 (62.62)	37 (34.58)	4 (3.74)	101 (94.39)	2 (1.87)	3 (2.80)	8 (7.48)	96 (89.72)
United Kingdom[2]	0 (0)	4259 (45.16)	5171 (54.84)	38 (0.40)	8699 (92.25)	693 (7.35)	0 (0)	5522 (58.56)	3908 (41.44)

[1] France: collects only use of azithromycin.

[2] United Kingdom: the duration of use of macrolides is not specified.

Table 7.5 shows the use of three treatments: inhaled antibiotics for more than three months during the survey year (any kind); macrolides (e.g. azithromycin) for more than three months; oxygen for home treatment. Both inhaled antibiotics and macrolides are frequently used but with marked differences between countries. Oxygen is used less frequently (severe lung disease).

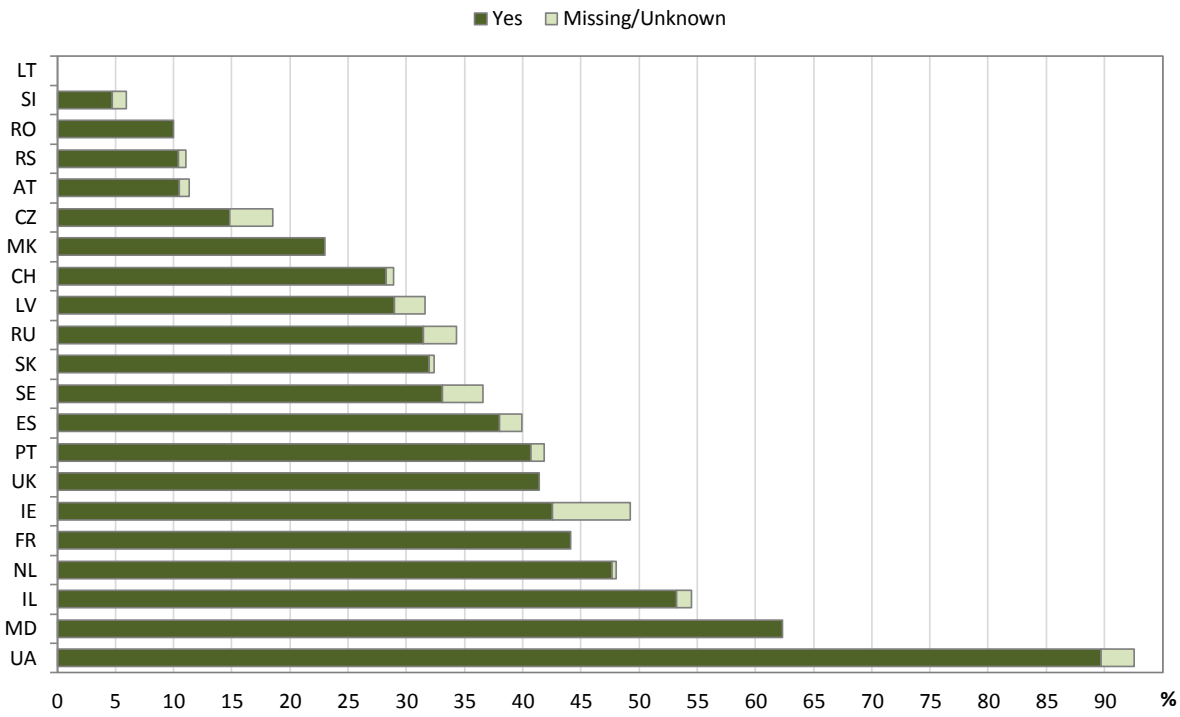
Figure 7.8 Use of inhaled antibiotics in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on inhaled antibiotics was missing for more than 10% of the patients.

This graph shows the use of inhaled antibiotics (of any kind) for more than three months during the survey year. The frequency varies considerably, from 8 to 65%. The dark green part of the bar shows the percentage of patients taking these drug, the light green part shows the percentage of patients for whom this information is missing.

Figure 7.9 Use of macrolides in all patients seen in 2014, by country.

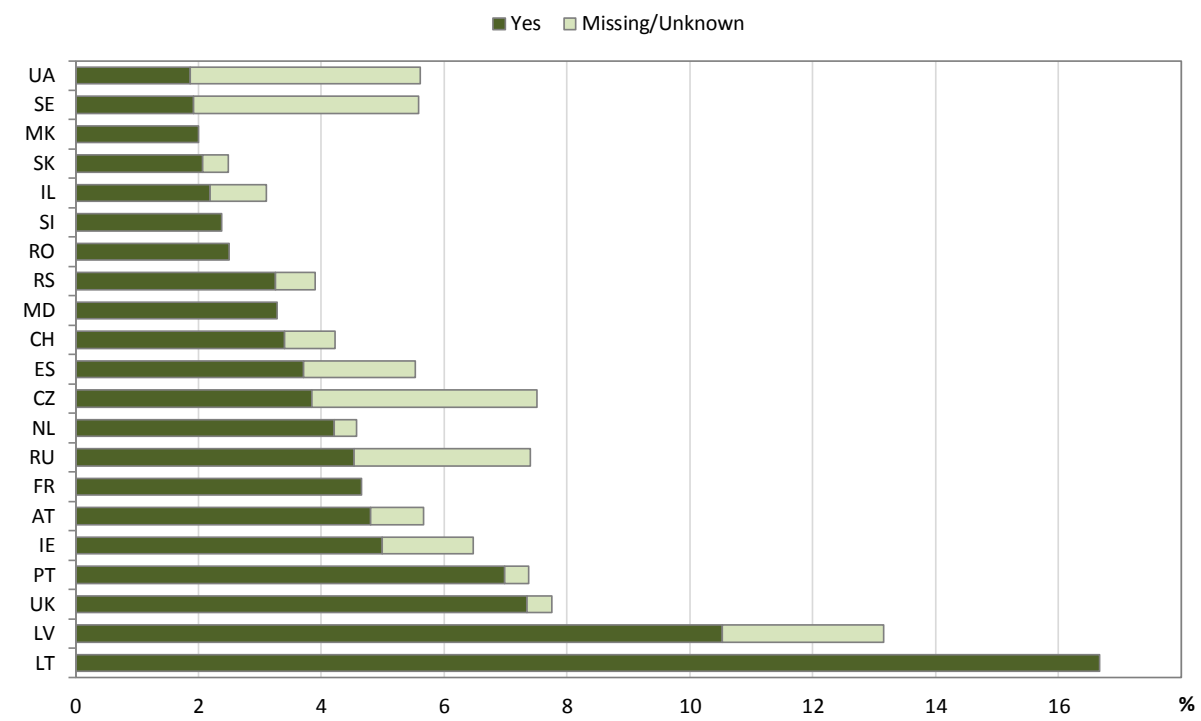


Note: We excluded from the graph the countries for which the information on use of macrolides was missing for more than 10% of the patients.

Note: France: collects only use of azithromycin for macrolides.
United Kingdom: the duration of use of macrolides is not specified.

This graph shows the use of macrolides for more than three months during the survey year (e.g. azithromycin). Macrolides are antibiotics, but taken continuously they also modulate the immune system. The dark green part of the bar indicates the percentage of patients taking these drug, the light green part shows the percentage of patients for whom this information is missing.

Figure 7.10 Use of oxygen in all patients seen in 2014, by country.



Note: We excluded from the graph the countries for which the information on the use of oxygen was missing for more than 10% of the patients.

This graph shows the use of oxygen at home during the survey year. Oxygen is used for severe lung disease. The dark green part of the bar indicates the percentage of patients using oxygen supplemen-tation, the light green part shows the percentage of patients for whom this information is missing.

8. Transplantation

We ask the countries if their patients have had a lung and/or liver transplantation, and in which year they had their (latest) transplant.

In some countries not all transplanted patients are in the CF centres' database or the CF national registry, because the patients have been transferred to a transplant centre. For this reason, the figures below may report a lower number of patients with a transplant than the true number, but it has not been possible to acquire more accurate data.

Table 8.1 Number of patients living in 2014 with transplanted lungs, by age and sex.

Age	Males	Females	Total	Transplants performed during the survey year
5-9	0	1	1	0
10-14	11	11	22	9
15-19	27	45	72	25
20-24	84	117	201	50
25-29	151	153	304	59
30-34	160	166	326	27
35-39	146	142	288	21
40-44	130	108	238	18
45+	151	98	249	20
Total	860	841	1701	229

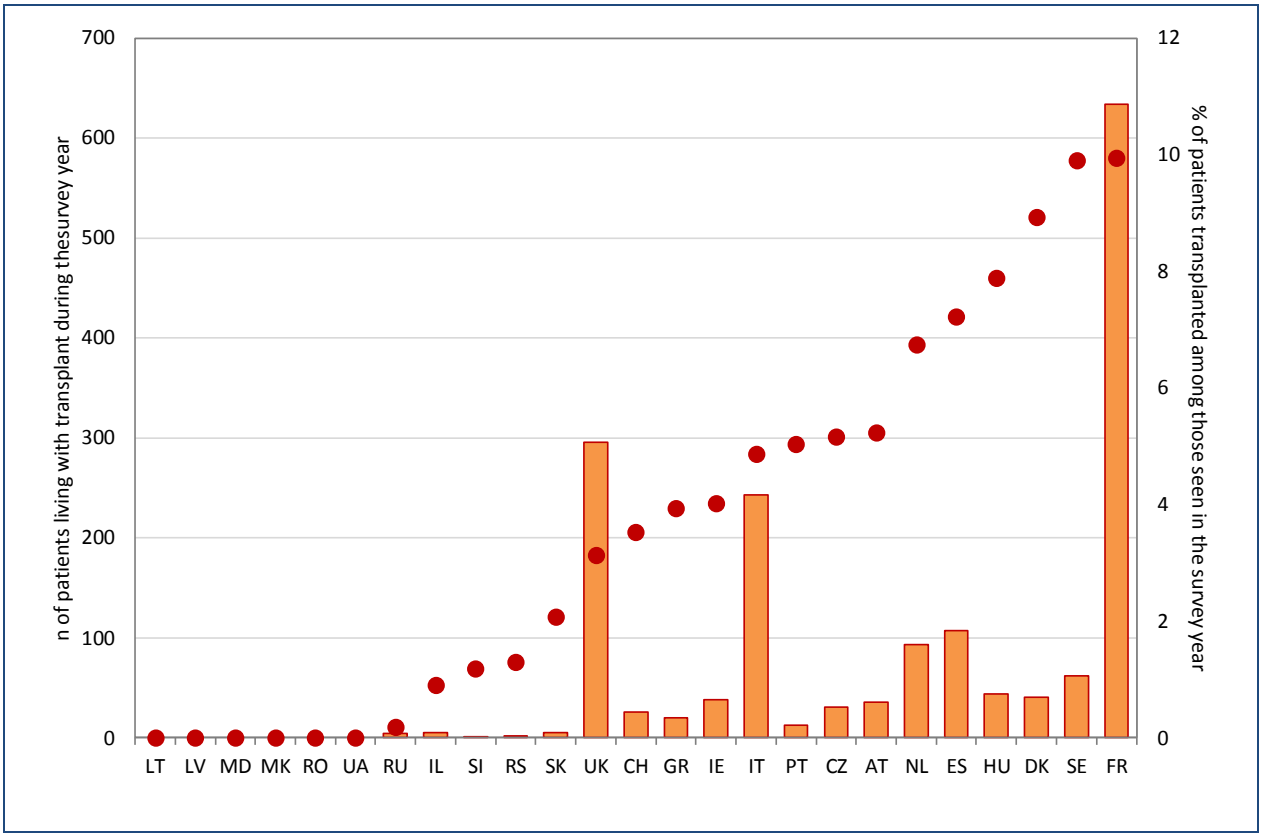
This table shows the number of patients alive in 2014 who have had a lung transplant at some time in their life, by age group, as well as the number of patients who have had a lung transplant during 2014.

Table 8.2 Number of patients living in 2014 with transplanted liver, by age and sex.

Age	Males	Females	Total	Transplants performed during the survey year
5-9	3	1	4	0
10-14	5	5	10	4
15-19	16	8	24	7
20-24	22	11	33	1
25-29	19	13	32	1
30-34	19	10	29	1
35-39	12	2	14	0
40-44	8	8	16	1
45+	5	2	7	1
Total	109	60	169	16

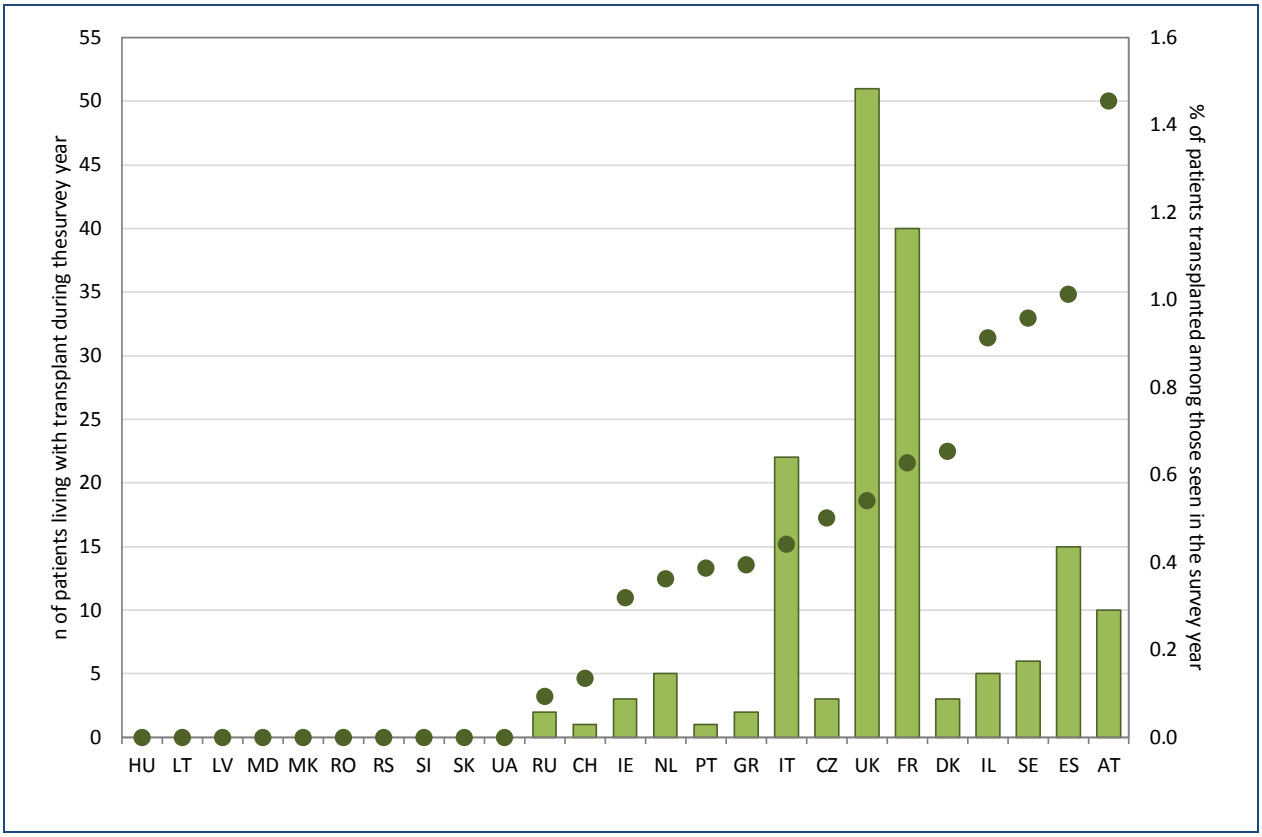
This table shows the number of patients alive in 2014 who have had a liver transplant at some time in their life, by age group, as well as the number of patients who have had a liver transplant during 2014.

Figure 8.1 Number of patients living in 2014 with transplanted lungs, by country.



This graph shows the number of patients alive in 2014 who have had a lung transplant (orange bars) at some point in their life. The red dots (right axis) show the percentage of patients living with transplanted lungs in 2014 among the patients that were seen in 2014.

Figure 8.2 Number of patients living in 2014 with transplanted liver, by country.



This graph shows the number of patients alive in 2014 who have had a liver transplant (green bars) at some point in their life. The dark green dots (right axis) show the percentage of patients that are living with a transplanted liver in 2014 among the patients that were seen in 2014.

Note that on the vertical axis the number of patients with liver transplant is much lower than the number with lung transplant. The main reason for this is that liver disease is only found in a subset of CF patients, whereas lung disease affects almost all patients.

9. Mortality

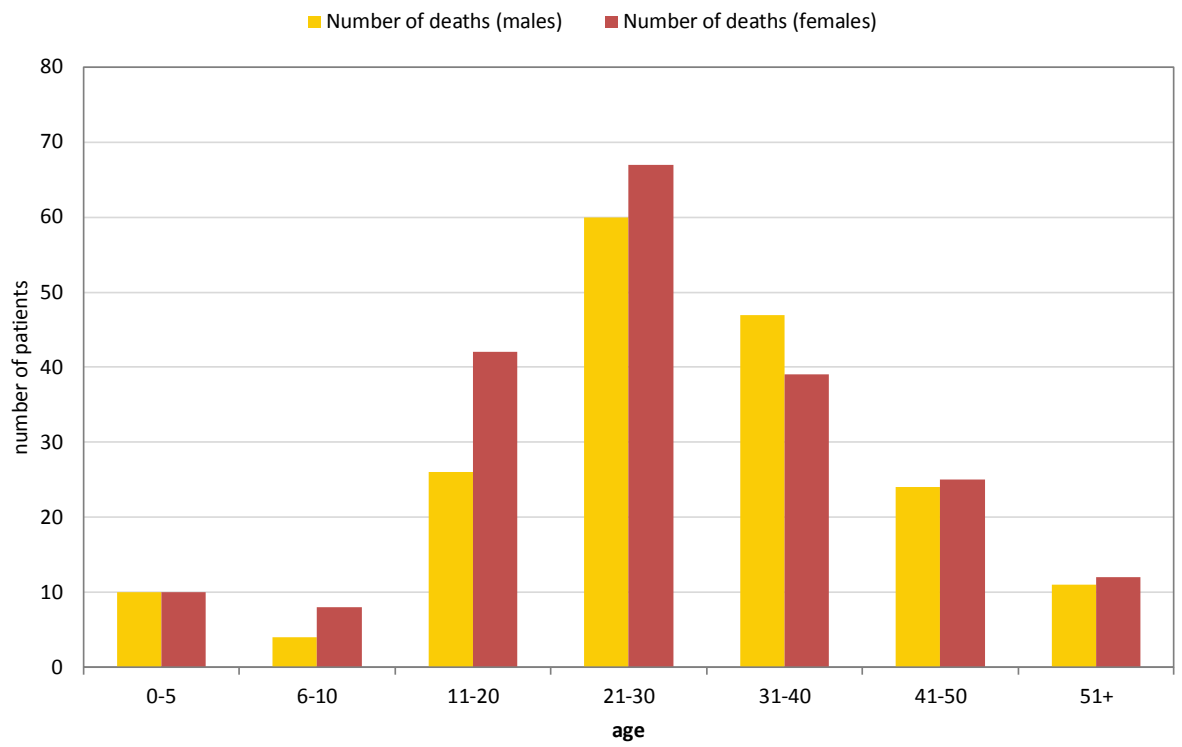
Table 9.1 Number of deaths in 2014, by age and sex.

Age at death	Number of male patients	% of deaths in this age group of all male deaths	Number of female patients	% of deaths in this age group of all female deaths	Total	% Total
0-5	10	5.49	10	4.93	20	5.19
6-10	4	2.20	8	3.94	12	3.12
11-20	26	14.29	42	20.69	68	17.66
21-30	60	32.97	67	33.00	127	32.99
31-40	47	25.82	39	19.21	86	22.34
41-50	24	13.19	25	12.32	49	12.73
51+	11	6.04	12	5.91	23	5.97
Total	182	100	203	100	385	100

Note: Only patients seen during the year are presented. Belgian 2013 data (N=1,153) is excluded. For the United Kingdom, all seen patients with confirmed diagnosis of CF are included (N=10,580). The total number of patients presented is 33,664.
Note: For 1 male patient date at death, and therefore age at death, is unknown.

This table shows the number of deaths in 2014 by age group and sex. Death in young children is very rare, and the most frequent age-range for death in both sexes is 21-30 years.

Figure 9.1 Age at death distribution of patients deceased in 2014, by sex.



Note: Only patients seen during the year are presented. Belgian 2013 data (N=1,153) is excluded. For the United Kingdom, all seen patients with confirmed diagnosis of CF are included (N=10,580). The total number of patients presented is 33,664.

Note: For 1 male patient date at death, and therefore age at death, was unknown.

This graph shows the distribution of age at death of patients who died in 2014, separately by males (yellow) and females (red).

Table 9.2 Cause of death distribution in 2014.

Cause of death	Number of deaths	Percentage of all deaths
Respiratory disease	243	62.95
Transplantation related	79	20.47
Non-CF related	22	5.70
Liver-GI related	4	1.04
Suicide	0	0.00
Trauma	1	0.26
Unknown	37	9.59
Total	386	100

Note: Ireland and United Kingdom collect cause of death “respiratory disease” as “cardio/ respiratory”.

This table shows cause of death for the deceased patients. The most frequent cause of death is respiratory disease. Please note that only a limited number of causes of death are collected, therefore if some deaths are due to rare complications of CF, they may have been classified as “Unknown”.

Publications

The ECFSPR data has been actively used for research in the period 2011–2015. We received 38 applications for data in total. The data applications are handled in accordance with the ECFSPR guidelines (www.ecfs.eu/projects/efcs-patient-registry/guidelines) and reviewed conscientiously by the Scientific Committee.

Several of the research projects have resulted in publications, and for some of the other projects manuscripts are in the pipeline. For an overview of the published articles we refer you to the webpage www.ecfs.eu/projects/ecfs-patient-registry/articles.

An overview of the approved applications for data from 2011 to 2015 for which there is no publication, can be found on the webpage www.ecfs.eu/projects/ecfs-patient-registry/overview-data-applications.

Partners and Contributors

Supported by an unrestricted grant from
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Appendix 1: Technical notes

Patient inclusion criteria

The ECFSPR registers patients diagnosed with CF in accordance with agreed definitions (see Appendix 2). Data of patients with a diagnosis that does not meet the agreed definitions are accepted in the database but not included in the analyses.

Data manipulation

To ensure that data was anonymous, we collected only year and month of birth and the day of birth was set to the 15th of the month (for Belgium, which only supplies year of birth for adults, month of birth was set to 7).

Unknown dates of lung function tests and of height/weight measurements were set to July 1st of the survey year.

For pre-natal diagnoses we set age at diagnosis equal to 0.
We checked for outliers and, whenever possible, we corrected the values according to instructions from the national registries/individual centres. If, after the data quality controls, aberrant values were still present in the database, we set them to missing for the purposes of this report.

Reference populations used for computing z-scores

The value of a z-score depends on the reference anthropometric chart: if different reference values are used, the same value of height (or weight or BMI) will result in different values of z-scores, and these differences could be of clinical importance. To compare the nutritional status of CF patients with that of healthy individuals an appropriate reference population must be used: ideally, a fair comparison requires that CF patients and healthy individuals belong to the same population. This implies the availability of a national reference.

The lack of a national reference for most countries participating in the ECFSPR obliged us to use an international reference to compute z-scores for height, weight and BMI. We decided to use the CDC 2000 reference charts (Kuczmarski RJ, Ogden CL, Guo SS et al. 2000 CDC Growth Charts for the United States: Methods and Development. National Centre for Health Statistics. Vital Health Stat 2002; 11(246):1-190.), which were derived from samples of U.S. healthy individuals[1]. The choice of CDC charts as a reference, although not the most suitable to assess the nutritional status of European CF patients, is justified by the widespread use of these charts at international level.

Reference populations used for computing FEV_1 predicted values

We computed the percent of predicted values for FEV_1 and FVC using:
The multi-ethnic reference values for spirometry for the 3-95-yr age range: the global lung function 2012 equations. Eur Respir J 2012; 40: 1324–1343).

In the addendum this year we have included the computations, as in previous reports, based on the references:

- for male children (6-17 years) and female children (6-15 years):
  Wang X, Dockery DW, Wypij D, Fay ME, Ferris BG. Pulmonary function between 6 and 18 years of age. Pediatr Pulmonol 1993; 15:75-88.

[1] For details on the target population, please see www.cdc.gov/growthcharts/2000growthchart-us.pdf.

- for male adults (≥18 years) and female adults (≥16 years):
  Hankinson JL, Odencrantz RJ, Fedan KB. Spirometric reference values from a sample of the general U.S. population. Am J Respr Crit Care Med 1999; 159:179-87.

Software used for data management and statistical analyses

SAS software, Version 9.4. Copyright, SAS Institute Inc. SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

Appendix 2: List of variables, inclusion criteria and definitions used by the ECFSPR

List of variables

Demographics
CF centre code
Patient code
Year of follow-up
Date of birth (year and month)
Gender
Status of patient
Cause of death
Date of death

Therapy
Inhaled continuous hypertonic NaCl this year
Inhaled continuous antibiotic this year
Inhaled continuous bronchodilators this year
In Oxygen therapy this year
Use of rhDNase this year
Use of continuous azithromycin (or other macrolide) this year
Use of ursodeoxycholic acid this year
Use of pancreatic enzymes this year

Diagnosis
Diagnosis confirmed
Age at diagnosis
Type of sweat test
Electrolytes
Chloride value
Meconium Ileus
Neonatal screening

Complications
Allergic bronchopulmonary aspergillosis this year
Diabetes: daily insulin treated this year
Pneumothorax requiring chest drain this year
Liver disease this year
Haemoptysis major over 250 ml this year
Pancreatic status: faecal elastase
Pancreatic status: faecal fat
Occurrence of malignancy this year

Genotype
First mutation
Second mutation

Microbiology
Chronic *Burkholderia cepacia complex*
Nontuberculous mycobacteria this year
Chronic *Pseudomonas aeruginosa*
Chronic *Staphylococcus aureus*
Stenotrophomonas maltophilia this year

Follow-up
Date of best FEV_1 recorded this year
Value of best FEV_1 recorded this year
Value of best FVC recorded this year
Height measured at date of best FEV_1 (or in case of no FEV_1 last height of the year)
Weight measured at date of best FEV_1 (or in case of no FEV_1 last height of the year)

Transplant
Liver transplant
Year of latest liver transplant (if occurred before or during this year)
Lung transplant
Year of latest lung transplant (if occurred before or during this year)

Inclusion criteria

Only patients who fulfil the diagnostic criteria below should be included in the registry.

a. **Two sweat tests value > 60 mmol/L chloride**: CF diagnosis accepted
b. **One sweat test value > 60 mmol/L chloride and DNA Analysis/Genotyping – two identified disease causing CF mutations**: CF diagnosis accepted
c. **Sweat value less than or equal to 60 mmol/L chloride**: if the sweat value is less than or equal to 60 mmol/L chloride, then at least 2 of these should be met:
    i. DNA Analysis/Genotyping – two identified disease causing CF mutations.
    ii. Transepithelial (Nasal) Potential Difference – study consistent with a diagnosis of CF.
    iii. Clinical Presentation – typical features of CF.
d. **Diagnosis reversal**: if the patient's CF diagnosis reversed during the year, identify the reason from the following options:
    i. DNA Analysis – unable to identify two disease causing CF mutations.
    ii. Transepithelial (Nasal) Potential Difference – study not consistent with a diagnosis of CF.
    iii. Repeat normal sweat testing – confirm with clinical team.

Definitions for EFCSPR

SWEAT TEST

If a sweat test was not performed on a patient, record "not done". If a sweat test is "not done" then two known genotype mutations must be reported.

i. Sweat Test: record the patient's sweat test.
ii. Electrolytes: Chloride concentration measurement is the preferred analysis.
iii. Chloride value: report the Chloride value in millimols per litre (mmol/L). If duplicate tests were completed on the same day, report the highest positive value.

NOTE: The acceptable range for Chloride values is 1-160 mmol/L. Anyone who has a Chloride value above 160 mmol/L must be re-tested.

SPIROMETRY

The purpose of recording data on spirometry values for the ECFS Patient Registry is to obtain standardised comparable data for comparison with other centres/countries and for use in specific epidemiological studies. Some of the conditions for this (see below) may not be met at every clinic visit for all patients. Therefore, for the purpose of the registry, only the spirometry tests fulfilling the criteria should be recorded/extracted for the ECFS Patient Registry. For all tests the spirometry should be performed according to the common ATS/ERS guidelines: (www.thoracic.org/statements/resources/pfet/PFT2.pdf).

Furthermore for the values reported to the registry the following criteria should be met

1. Pre-test
    a. date of birth, gender and height should be recorded for calculation of predicted values
    b. all recorded spirometry tests should be pre-bronchodilator* values
        i. short-acting bronchodilators: at least 4 hours pre-test
        ii. long-acting bronchodilators: at least 12 hours pre-test

    *This was decided according to the PortCF official definitions.
2. Reported values
    a. for values reported to national registries or to centres and extracted to the ECFS Patient Registry, the value in litres of the highest available value of FEV_1% of predicted (according to local references) of the year should be extracted
    b. each patient's FVC and FEV_1 measurement must be reported in litres (L), with up to two places to the right of the decimal
    c. the FVC measurement must be greater than or equal to the FEV_1 measurement
    d. for each reported spirometry value, the date of the test and the patient's height at that date should be reported in order to perform the calculation of percent of predicted values
    e. only tests deemed valid according to ATS/ERS guidelines should be reported
3. Calculation of percent of predicted values. A common set of reference values is used:
    Global Lung Function Initiative equations described by Quanjer PH et al. (Multi-ethnic reference values for spirometry for the 3-95-yr age range: the global lung function 2012 equations. Eur Respir J 2012; 40: 1324–1343).

In previous reports and presented in Appendix 3 of this report, page 126, calculations are based on the reference values:

a. for male children 6-17 yrs and female children 6-15 yrs: Wang et al (1993)
b. for male adults ≥ 18 yrs and females ≥ 16 yrs: Hankinson et al (1999)
c. for children < 6 yrs no calculation of percent of predicted values will be performed because of lack of valid reference values

The ECFSPR Definition Group considered the issue of race-specific reference values and decided not to do this calculation and not to record race for European patients.

References:
a) Miller et al. Standardisation of spirometry. Eur Respir J 2005; 26: 319–338
b) Miller et al. General considerations for lung function testing. Eur Respir J 2005; 26: 153–161
c) Cystic Fibrosis Foundation Patient Registry User's Guide, Version 4.0. 2006
d) Rosenfeld et al. Task Force to Evaluate Choice of Spirometric Reference Equations for the National Patient Registry: Summary and Recommendations. Cystic Fibrosis Foundation Registry Committee; 2005
e) Hankinson JL, Odencrantz RJ, Fedan KB. Spirometric reference values from a sample of the general U.S. population. Am J Respr Crit Care Med 1999;159:179-87
f) Wang X, Dockery DW, Wypij D, Fay ME, Ferris BG. Pulmonary function between 6 and 18 years of age. Pediatr Pulmonol 1993;15:75-88

NUTRITION

Measurements: weight and height are measured according to EuroCareCF guidelines

a. weight: removal of outer clothing, shoes and socks
b. height: without shoes and socks - stadiometer - top of head in contact with head board, slight pressure
c. it should be the value at the day of the recorded FEV_1

z-scores for height, weight and BMI will be calculated using the CDC reference values [Kuczmarski et al (2002)]

References:
a) Kromeyer-Hauschild K, Wabitsch M, Kunze D, Geller F, Geiss HC, Hesse V *et al.* Percentiles of body mass index in children and adolescents evaluated from different regional German studies. Monatsschr Kinderheilkd 2001; 149:807-818
b) Lai H-C, Corey M, FitzSimmons S, Kosorok MR, Farrell M. Comparision of growth status of patients with cystic fibrosis between the United States and Canada. Am J Clin Nutr 1999; 69:531-538
c) Public Use File BGS98, German National Health Interview and Examination Survey 1998, Robert-Koch-Institut, Berlin, Germany, 2000
d) Wiedemann B, Paul KD, Stern M, Wagner TO, Hirche TO, on behalf of the German CFQA Group. Evaluation of body mass index percentiles for assessment of malnutrition in children with cystic fibrosis. Eur J Clin Nutr 2007; 61, 759-768
e) Kuczmarski RJ, Ogden CL, Guo SS et al. 2000 CDC Growth Charts for the United States: methods and development. Vital Health Stat 2002; 11(246): 1-190

DEFINITION OF CHRONIC INFECTION IN THE LOWER AIRWAYS

1. Chronic PA infection should be defined by local physician according to modified Leeds criteria[a] and/or anti-pseudomonas antibodies[b]. Patient should be defined as chronically infected if he/she fulfils the criteria now or has done so in recent years and the physician has no reason to think the status has changed
   a. modified Leeds criteria, chronic infection: >50% of the sputum samples, collected during the last 12 months were positive. At least 4 sputum samples during that period
   b. and/or significantly raised anti-pseudomonas antibodies according to local laboratories
2. Chronic infection with other gram-negative bacteria should be recorded by the same criteria as above

References:
a) Lee TWR, Brownlee KG, Conway SP, Denton M, Littlewood JM. Evaluation of a new definition for chronic Pseudomonas aeruginosa in cystic fibrosis patients. J Cystic Fibrosis
b) Proesmans M, Balinska-Miskiewiscz, Dupont L et al. Evaluating the "Leeds criteria" for Pseudomonas aeruginosa infection in a cystic fibrosis centre. Eur Resp J 2006;27:937-943.
c) Doring G, Conway SP, Heijerman HG, et al. Antibiotic therapy against Pseudomonas aeruginosa in cystic fibrosis: a European consensus. Eur Respir J 2000;16:749-767

ALLERGIC BRONCHOPULMONARY ASPERGILLOSIS (ABPA)

Diagnostic criteria:

1. Acute or subacute clinical deterioration (cough, wheeze, exercise intolerance, exercise-induced asthma, change in pulmonary function, or increased sputum production) not attributable to another etiology.
2. Total IgE > 500 IU/ml.
3. Positive skin prick test for Aspergillus antigen (> 3 mm) or positive specific IgE for *A. fumigatus*.

4. Either:
   a. precipitins to *A. fumigatus* or in vitro demonstration of IgG antibody to *A. fumigatus*;
   b. or new or recent abnormalities on chest radiography (infiltrates or mucus plugging) or chest CT (characteristic changes) that have not cleared with antibiotics and standard physiotherapy.

References:
Stevens DA, Moss RB, Kurup VP, Knutsen AP, Greenberger P, Judson MA, Denning DW, Crameri R, Brody AS, Light M, Skov M, Maish W, Mastella G; Participants in the Cystic Fibrosis Foundation Consensus Conference. Allergic bronchopulmonary aspergillosis in cystic fibrosis--state of the art: Cystic Fibrosis Foundation Consensus Conference. Clin Infect Dis. 2003 Oct 1;37 Suppl 3:S225-64.

LIVER DISEASE

We adopt the definitions for Liver Disease used by the UK Registry. These definitions discriminate patients with severe liver disease (with portal hypertension) from milder cases (cirrhosis without portal hypertension).

Cirrhosis with Hypertension: scaring of the liver related to underlying CF, typically in a biliary pattern. Severe liver disease may include portal hypertension and/or hypersplenism.

Cirrhosis without Hypertension: scaring of the liver relating to underlying CF.

Liver disease without cirrhosis: this includes fatty liver or viral hepatitis but not biliary cirrhosis.

PANCREATIC STATUS

Definition:

Stool fat (van de Kamer) > 4-5 g/d in young children, > 7g/d in children above 10 yrs and adults and/or faecal pancreatic elastase-1 < 200 ug/g.

Two determinations are mandatory. Faecal fat excretion values of infants below 3 months are contradictory. Other than pancreatic causes of steatorrhoea must have been excluded.

Pancreatic status will be assessed at the registry level, according to the following:

Pancreatic insufficiency

Faecal elastase <200 µg/g (twice) and Faecal fat high (twice)*

Pancreatic sufficiency

Faecal elastase ≥200 µg/g (twice) and Faecal fat normal (twice)*

*according to definition above

References:
a) Sinaasappel M, Stern M, Littlewood J, Wolfe S, Steinkamp G, Heijerman HGM, Robberecht E, Döring G. Nutrition in patients with cystic fibrosis. A European consensus. J Cystic Fibrosis 2002; 1:51-75.
b) Walkowiak J, Nousia-Arvanitakis S, Henker J, Stern M, Sinaasappel M, Dodge JA. Invited review: Indirect pancreatic function tests in children. J Pediatr Gastroenterol Nutr 2005; 40:107-114.

Appendix 3: Lung Function

In this report we have introduced the computations based on the Global Lung Function Initiative equations described by Quanjer PH et al. In this appendix the graphs and tables of lung function are presented based on the reference populations and the equations described by Wang et al. for children and Hankinson et al. for adults (see Appendix 1, page 120, for full reference).

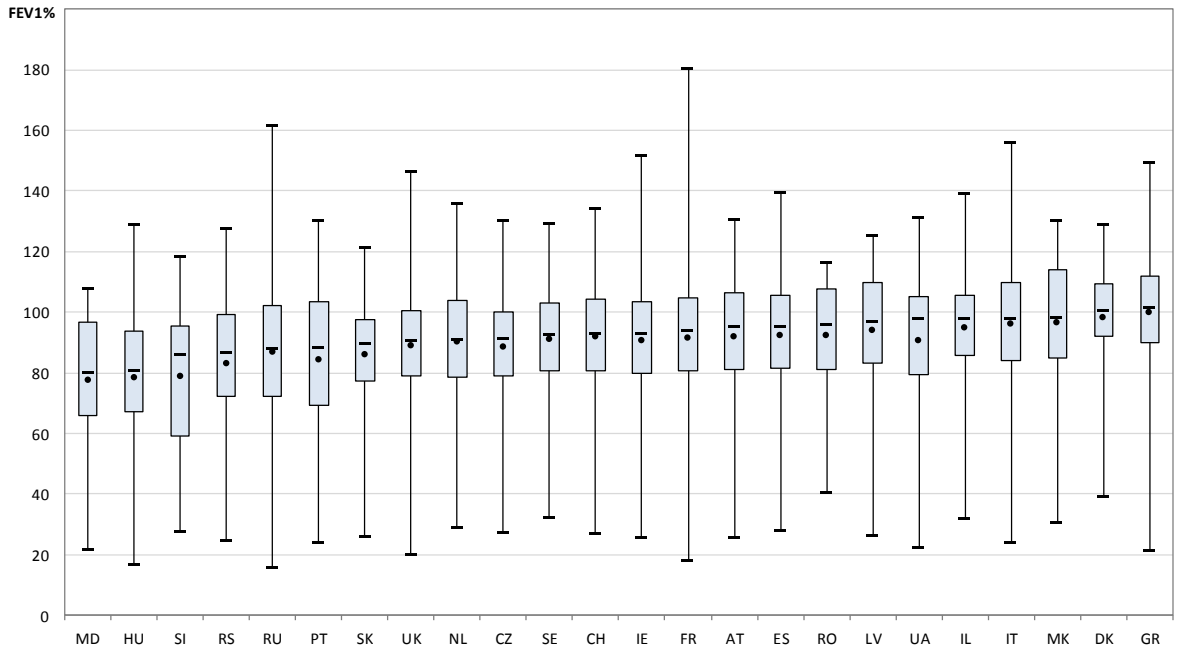
Table 10.1 FEV_1% of predicted: descriptive statistics, by country. Patients aged 6-17 years who have never had a lung transplant.

Country	N	N Miss	Mean (average FEV_1%)	Min	25th pctl (25% of patients have FEV_1% below this value)	Median (50% of patients have FEV_1% below this value)	75th pctl (75% of patients have FEV_1% below this value)	Max
Austria	252	3	92.0	25.4	80.9	95.1	106.3	130.7
Czech Republic	201	13	88.5	27.4	79.2	91.4	99.9	130.3
Denmark	140	0	98.3	39.1	92.0	100.8	109.3	129.2
France	2029	103	91.5	17.8	80.5	93.9	104.7	180.5
Greece	130	2	99.7	21.4	89.9	101.6	112.1	149.4
Hungary	207	16	78.2	16.7	67.2	80.8	93.8	129.2
Ireland	358	12	90.7	25.7	80.0	93.2	103.3	151.9
Israel	173	5	95.0	31.8	85.8	97.7	105.6	139.0
Italy	1057	27	96.1	24.0	84.2	97.9	109.7	156.1
Latvia	15	0	93.8	26.4	83.2	96.8	109.6	125.3
Rep of Macedonia	51	2	96.5	30.7	85.1	98.3	114.1	130.3
Rep of Moldova	22	2	77.7	22.0	66.1	79.9	96.6	108.0
The Netherlands	410	10	90.2	29.1	78.5	91.1	103.7	135.6
Portugal	103	8	84.4	23.9	69.4	88.3	103.5	130.4
Romania	23	0	92.3	40.4	80.9	96.1	107.9	116.2
Russian Federation	534	244	86.8	15.7	72.1	88.1	102.4	161.4
Serbia	74	0	83.0	24.9	72.4	86.8	99.3	127.9
Slovak Republic	76	0	86.0	26.2	77.2	89.7	97.7	121.4
Slovenia	35	0	78.8	27.5	59.3	86.0	95.3	118.4
Spain	517	18	92.3	28.0	81.7	95.1	105.4	139.5
Sweden[1]	163	6	90.9	32.5	80.8	92.9	102.9	129.4
Switzerland	226	4	91.8	26.9	80.8	93.1	104.4	134.2
Ukraine	60	1	90.8	22.3	79.5	97.6	105.1	131.1
United Kingdom[2]	2106	745	88.7	19.9	79.2	90.7	100.5	146.4

[1] Sweden reports FEV_1 collected at the time of the annual review.
[2] United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: For Lithuania coverage is 0% for children.

Table 10.1 shows some descriptive statistics for FEV_1 in children, expressed as % of predicted. Note that patients who have had a lung transplant and children below 6 years of age have been excluded from the analyses.

Figure 10.1 FEV_1% of predicted: box-plot, by country and overall. Patients aged 6-17 years who have never had a lung transplant.



Note: Sweden reports FEV_1 collected at the time of the annual review.
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: For Lithuania coverage is 0% for children.

This box-plot is a graphic representation of the FEV_1 in children, expressed as % of predicted detailed in table 10.1. For each country the dash (black line crossing the blue box) is the median, the black dot is the mean and the whiskers (vertical lines with a T-shaped end) are the minimum and the maximum.

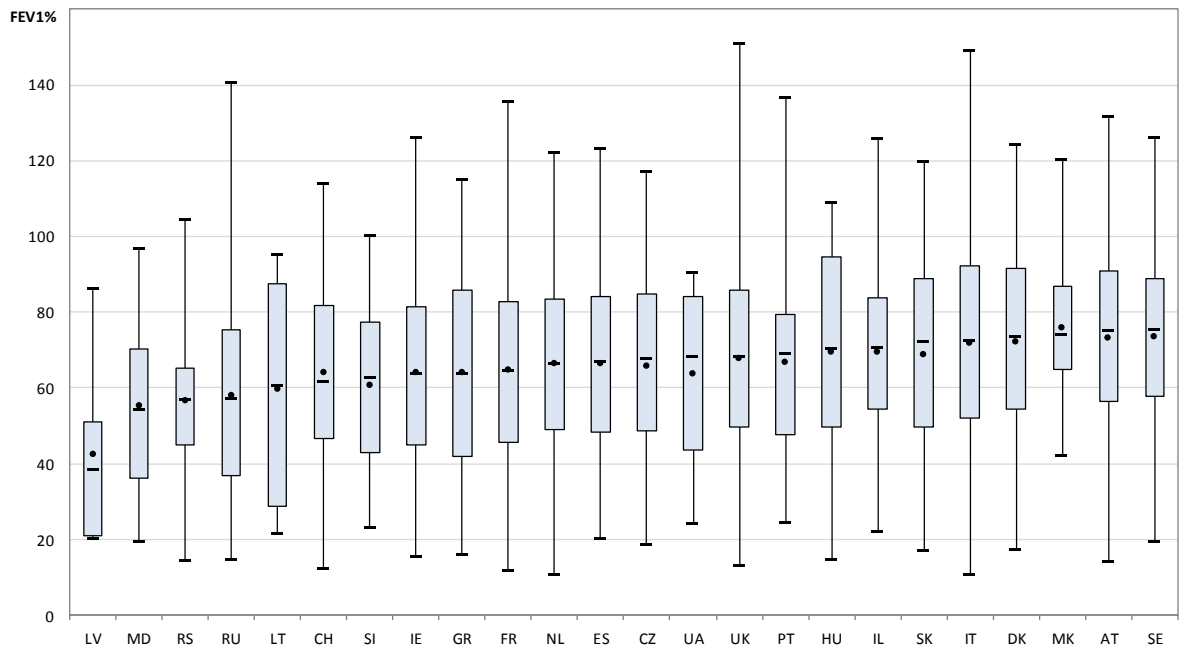
Table 10.2 FEV_1% of predicted: descriptive statistics, by country. Patients aged 18 years or older who have never had a lung transplant.

Country	N	N Miss	Mean (average FEV_1%)	Min	25th pctl (25% of patients have FEV_1% below this value)	Median (50% of patients have FEV_1% below this value)	75th pctl (75% of patients have FEV_1% below this value)	Max
Austria	265	2	73.2	13.9	56.3	75.1	90.8	131.7
Czech Republic	132	77	65.8	18.7	48.6	67.9	84.8	117.1
Denmark	222	0	72.0	17.4	54.3	73.5	91.4	124.0
France	2508	62	64.7	11.7	45.6	64.8	82.9	135.5
Greece	185	0	64.0	16.1	42.0	63.8	85.9	114.9
Hungary	162	7	69.6	14.6	49.6	70.6	94.6	108.9
Ireland	329	19	63.9	15.4	45.1	63.7	81.4	126.3
Israel	265	0	69.3	22.2	54.3	70.9	83.7	125.8
Italy	1890	52	71.8	10.6	51.9	72.4	92.2	149.0
Latvia	<10	0	42.5	20.1	20.9	38.4	50.9	86.4
Lithuania	12	0	59.7	21.4	28.7	60.8	87.6	95.0
Rep of Macedonia	22	0	75.9	42.0	65.0	74.2	86.9	120.6
Rep of Moldova	13	0	55.1	19.4	36.1	54.4	70.2	96.7
The Netherlands	638	24	66.3	10.8	49.0	66.5	83.5	122.2
Portugal	82	1	66.9	24.4	47.7	69.2	79.5	136.7
Russian Federation	398	134	58.1	14.6	36.8	57.2	75.5	140.6
Serbia	38	0	56.6	14.4	45.0	56.9	65.1	104.6
Slovak Republic	112	0	68.9	17.1	49.7	72.1	88.7	119.6
Slovenia	22	0	60.8	23.3	43.0	62.8	77.5	100.3
Spain	474	13	66.4	20.1	48.3	67.0	84.1	123.0
Sweden[1]	309	10	73.6	19.4	57.9	75.5	88.9	126.1
Switzerland	303	0	63.9	12.3	46.8	61.6	81.7	113.9
Ukraine	10	1	63.8	24.2	43.5	68.3	84.1	90.3
United Kingdom[2]	3533	1261	67.9	13.0	49.6	68.5	85.7	150.7

[1] Sweden reports FEV_1 collected at the time of the annual review.
[2] United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has only one adult patient and is excluded from the table.

This table shows some descriptive statistics for FEV_1 in adults, expressed as % of predicted. Note that patients who have had a lung transplantation have been excluded from the analyses.

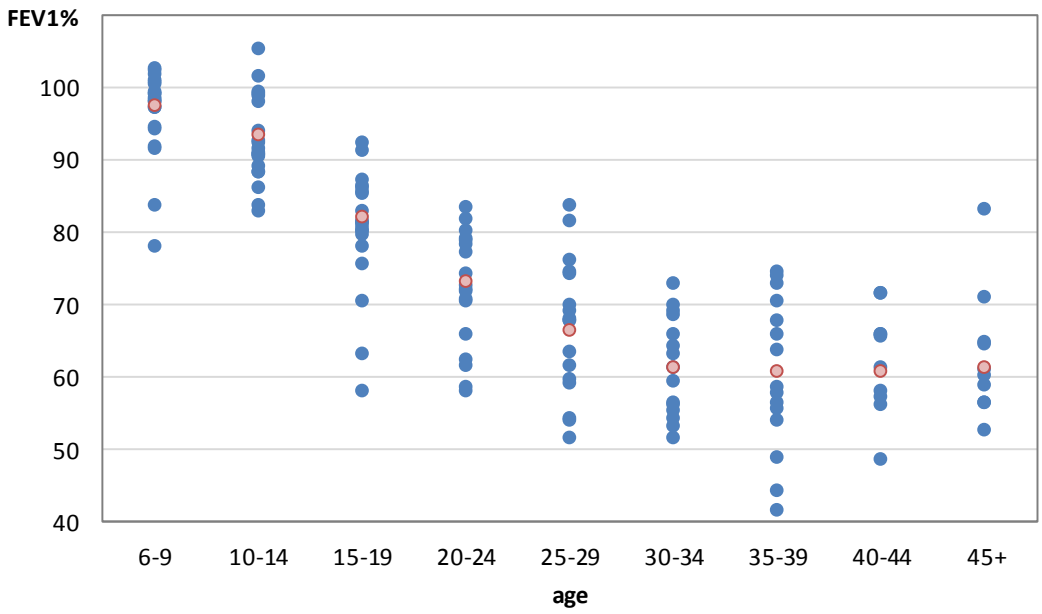
Figure 10.2 FEV_1% of predicted: box-plot, by country and overall. Patients aged 18 years or older who have never had a lung transplant.



Note: Sweden reports FEV_1 collected at the time of the annual review.
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has only one patient and is excluded from the graph.

This box-plot is a graphic representation of the FEV_1 in adults, expressed as % of predicted detailed in table 10.2. For each country the dash (black line crossing the blue box) is the median, the black dot is the mean and the whiskers (vertical lines with a T-shaped end) are the minimum and the maximum.

Figure 10.3 Median FEV_1% of predicted by age group and by country. Patients aged 6 years or older who have never had a lung transplant.



Note: We excluded from the analyses those age groups wherein the number of patients was <10.
Note: Not all the countries reported the best FEV_1 value of the year (see tables 4.1 and 4.2).

This graph shows the median FEV_1% (the value that separates the highest and lowest half of the patients) by age group. Each country is represented by a dot (in blue) and the overall estimate is in red. The general pattern shows that the FEV_1% slowly decreases until the age of 30-34, and then levels out. The patients in the oldest age groups are patients who survived, and may therefore represent the patients with less disease severity. There is considerable variability between countries.

Table 10.3 FEV_1% of predicted: descriptive statistics by age group (patients aged 6 years or older) who have never had a lung transplant.

Age at FEV_1 measurement	N	N Miss	Mean	Min	25th pctl	Median	75th pctl	Max
6-9	3089	503	96.1	18.6	86.4	97.7	107.1	161.4
10-14	3681	434	91.6	24.9	80.5	93.5	104.1	180.5
15-19	3575	466	79.3	14.4	65.2	82.1	94.8	150.7
20-24	3190	416	71.5	12.3	54.5	73.3	89.4	149.0
25-29	2474	351	65.9	10.6	47.0	66.5	84.2	143.3
30-34	1784	231	63.0	13.2	44.2	61.4	80.0	134.1
35-39	1181	155	62.8	11.7	43.8	60.8	80.7	130.6
40-44	777	130	63.0	13.9	44.1	60.9	80.9	138.5
45+	1142	198	64.2	10.8	44.7	61.4	82.4	137.3

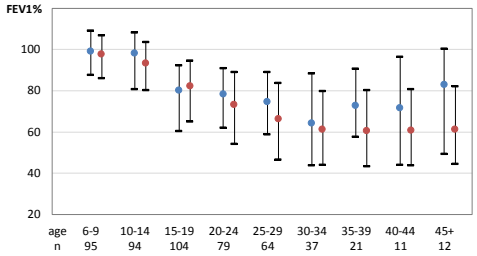
Note: Not every country reported the best FEV_1 value of the year (see tables 4.1 and 4.2).

This table shows FEV_1% by age group for the total data set. The median values reported in this table are shown as red dots in fig 10.3.

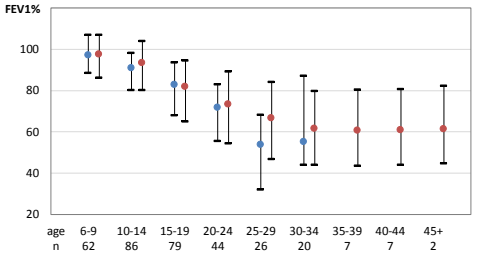
Figure 10.4 Quartiles of FEV_1% of predicted by age group and by country. Patients aged 6 years or older and who have never had a lung transplant.

The figures below show the FEV_1% in different age groups, separately for each country. The dot shows the median, and the whiskers show the 25th and 75th percentiles (the median, the 25th percentile and the 75th percentile are collectively named "quartiles"). In blue are the quartiles for the country, in red are the pooled quartiles computed on all other countries (i.e. excluding that country). We did not compute quartiles where the number of patients is <10 in an age group, so there are no blue dots for those age groups (the number of patients in each age group is shown below the horizontal axis). We therefore excluded Latvia and Lithuania from the graphs because none of the age groups had more than 10 patients.

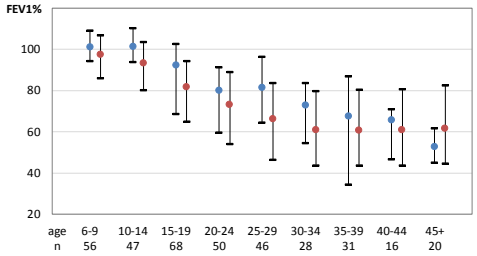
Quartiles of FEV_1%: Austria



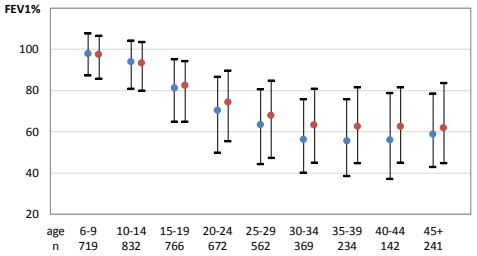
Quartiles of FEV_1%: Czech Republic



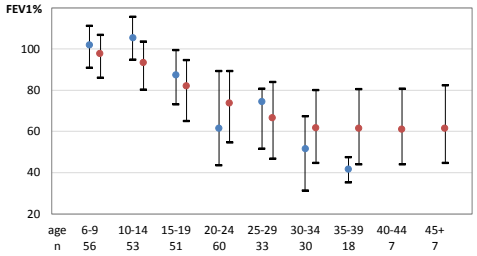
Quartiles of FEV_1%: Denmark



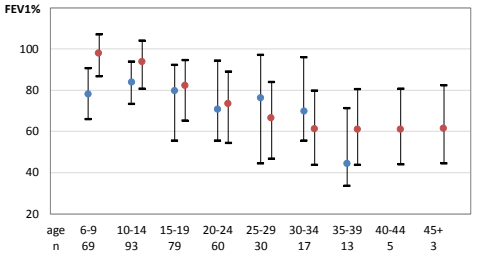
Quartiles of FEV_1%: France



Quartiles of FEV_1%: Greece

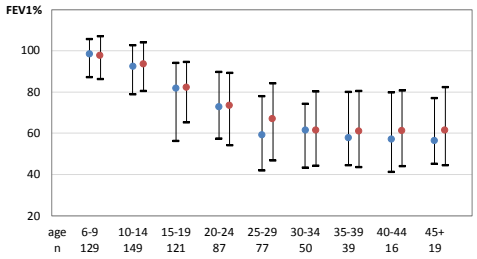


Quartiles of FEV_1%: Hungary

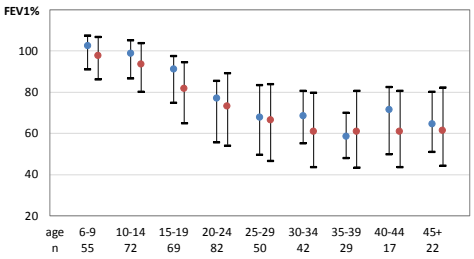


[figure 10.4 continued]

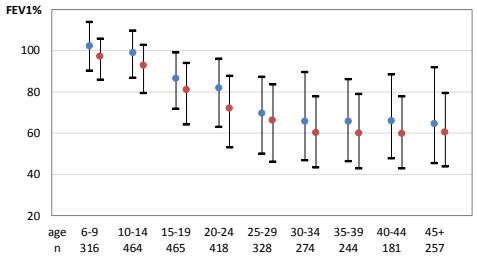
Quartiles of FEV_1%: Ireland



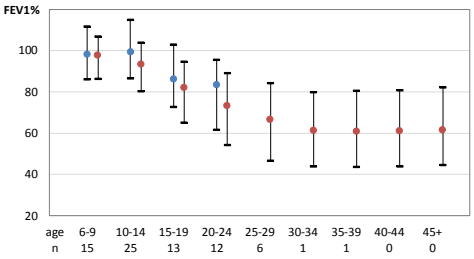
Quartiles of FEV_1%: Israel



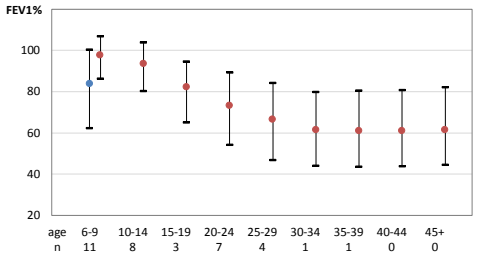
Quartiles of FEV_1%: Italy



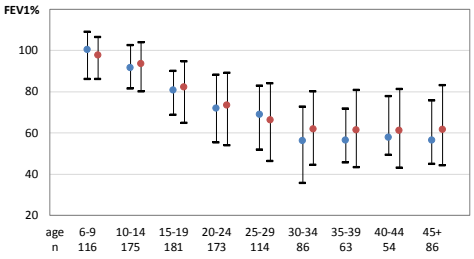
Quartiles of FEV_1%: Rep of Macedonia



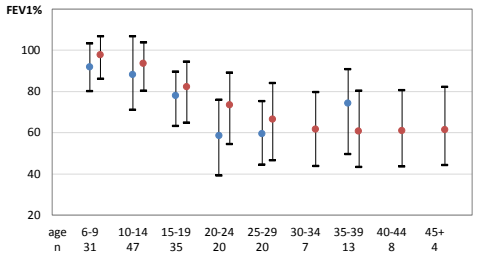
Quartiles of FEV_1%: Rep of Moldova



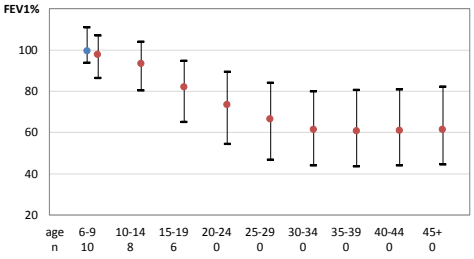
Quartiles of FEV_1%: The Netherlands



Quartiles of FEV_1%: Portugal

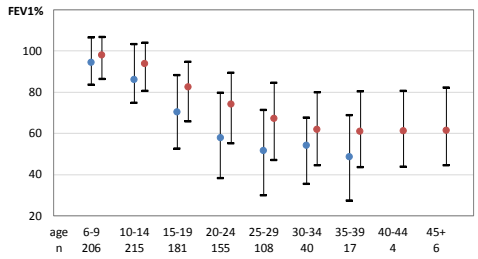


Quartiles of FEV_1%: Romania

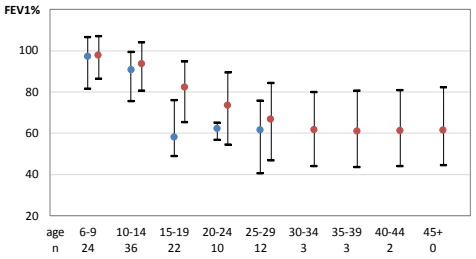


[figure 10.4 continued]

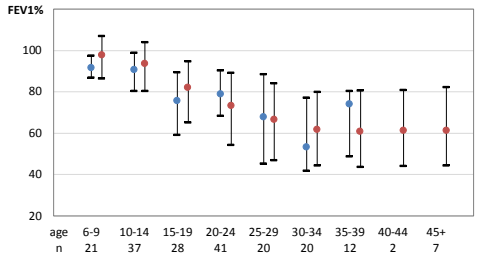
Quartiles of FEV_1%: Russian Federation



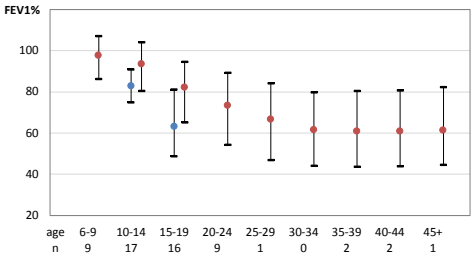
Quartiles of FEV_1%: Serbia



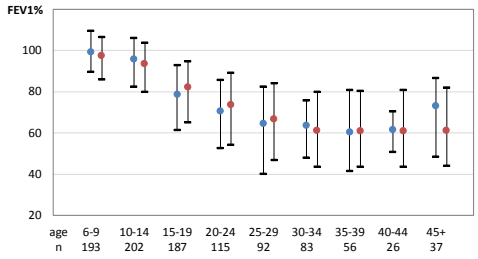
Quartiles of FEV_1%: Slovak Republic



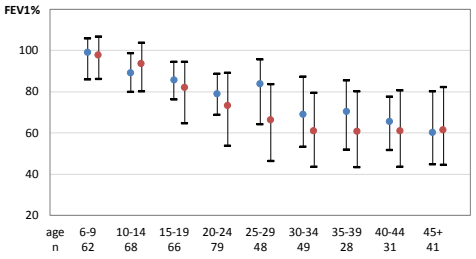
Quartiles of FEV_1%: Slovenia



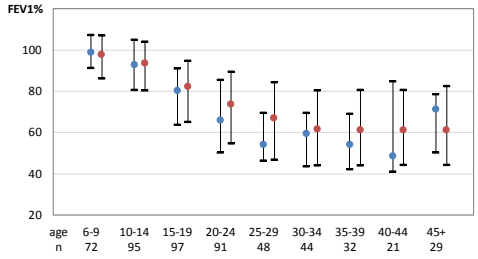
Quartiles of FEV_1%: Spain



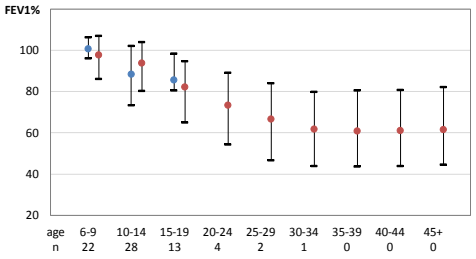
Quartiles of FEV_1%: Sweden[1]



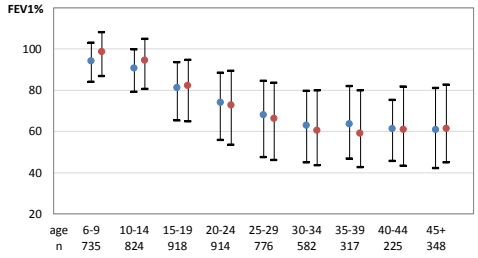
Quartiles of FEV_1%: Switzerland



Quartiles of FEV_1%: Ukraine



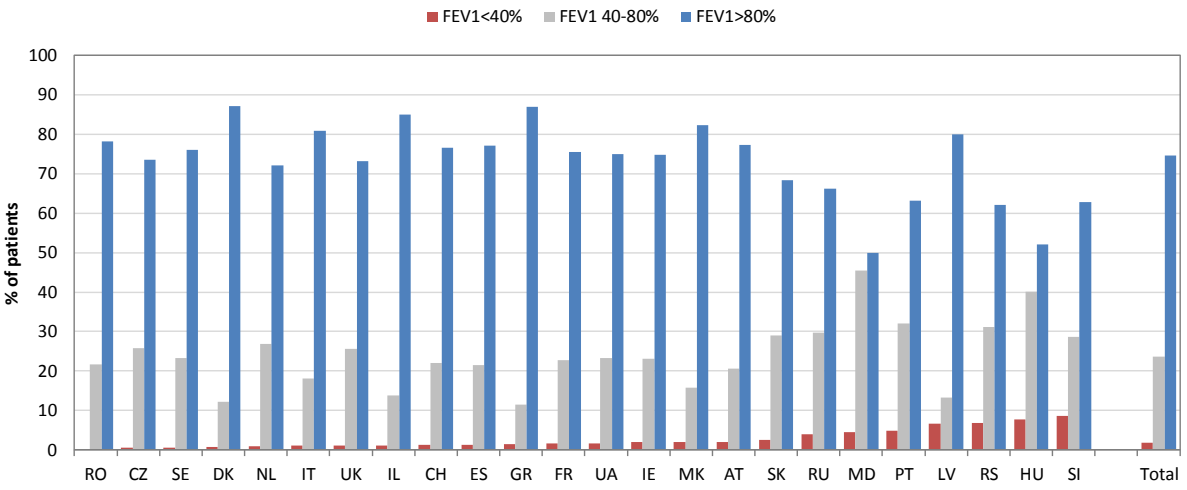
Quartiles of FEV_1%: United Kingdom[2]



[1] Sweden reports FEV_1 collected at the time of the annual review.

[2] United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.

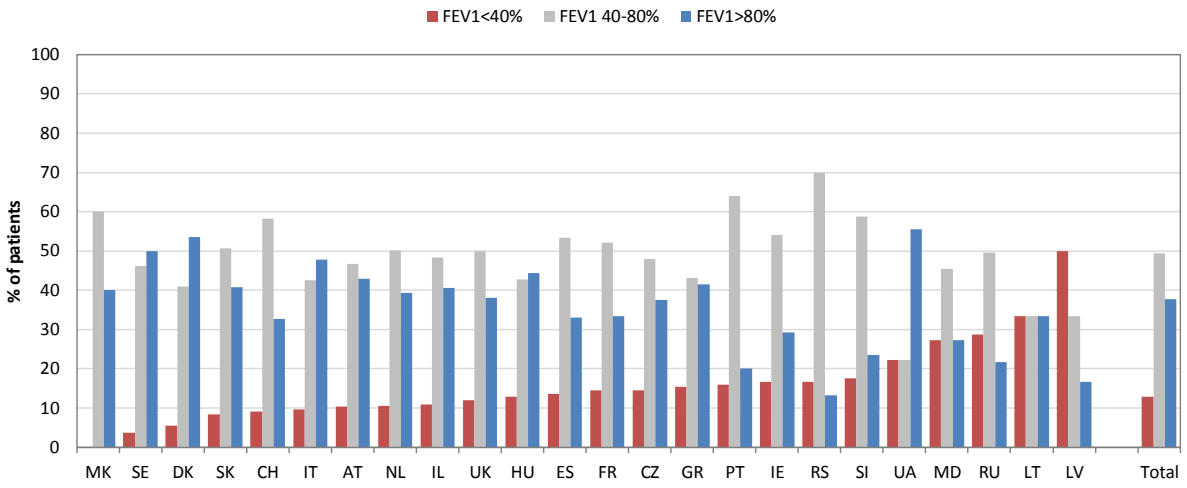
Figure 10.5 FEV_1% of predicted according to severity group and age group, by country and overall. Patients aged 6-17 years who have never had a lung transplant.



Note: Not every country reported the best FEV_1 value of the year:
Sweden reports FEV_1 collected at the time of the annual review;
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: For Lithuania coverage is 0% for children.

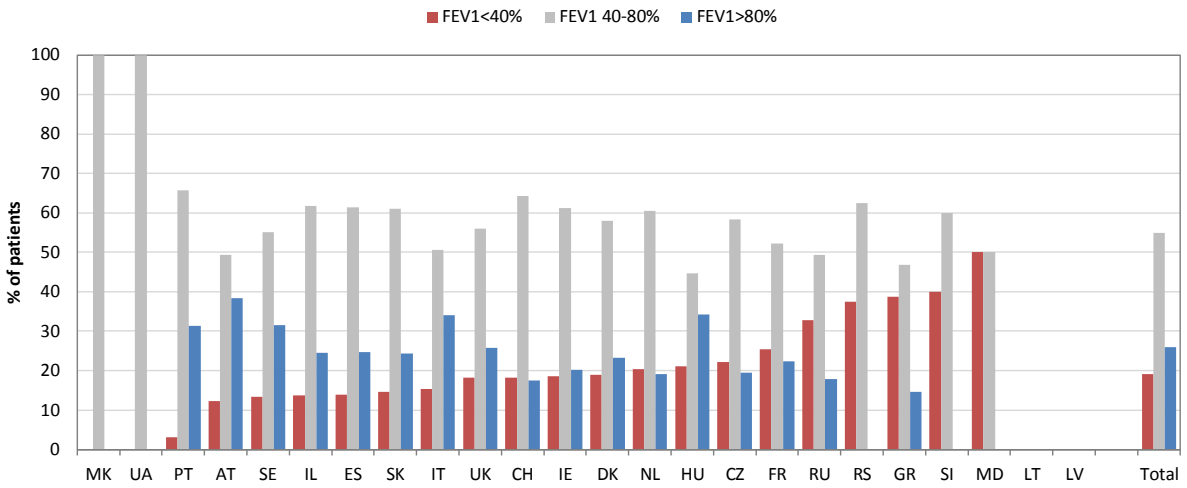
Figures 10.5, 10.6 and 10.7 show the FEV_1% by severity group, by country and overall. Patients with a FEV_1% higher than 80% are generally considered to have mild lung disease, patients with FEV_1% between 80% and 40% moderate lung disease, and patients with FEV_1 <40% severe lung disease. However, since a 10 year old child with a lung function of 50% has considerably worse lung disease than a 50 year old patient with the same FEV_1%, and the age distribution is not the same in all countries, we have chosen to present children (fig 10.5) and adults (fig 10.6 and 10.7) separately.

Figure 10.6 FEV_1% of predicted according to severity group and age group, by country and overall. Patients aged 18-29 years who have never had a lung transplant.



Note: Not every country reported the best FEV_1 value of the year:
Sweden reports FEV_1 collected at the time of the annual review;
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has only one patient and is excluded from the graph.

Figure 10.7 FEV_1% of predicted according to severity group and age group, by country and overall. Patients aged 30 years or older who have never had a lung transplant.



Note: Not every country reported the best FEV_1 value of the year:
Sweden reports FEV_1 collected at the time of the annual review;
United Kingdom reports FEV_1 collected at the time of the annual review. All analyses of FEV_1 in the UK 2014 annual report are restricted to those patients for whom prior annual surveys showed no prior lung transplants.
Note: Romania has only one patient and is excluded from the graph.