

# Clinical Outcomes and Survival Differences in People with Cystic Fibrosis Living in Europe

Orenti Annalisa<sup>(1)</sup>, Naehrlich Lutz<sup>(2)</sup>, Bakkeheim Egil<sup>(3)</sup>, Hatziaogorou Elpis<sup>(4)</sup>, Kerem Eitan<sup>(5)</sup>, Sermet-Gaudelus Isabelle<sup>(6,7)</sup> on behalf of ECFSPR Steering Group

(1) Department of Clinical Sciences and Community Health, Laboratory of Medical Statistics, Biometry and Epidemiology "G. A. Macca-  
caro", University of Milan, Milan, Italy (presenting author)

(2) Department of Pediatrics, Justus-Liebig-University Giessen, Giessen, Germany

(3) National Resource Centre for Cystic Fibrosis, Oslo University Hospital, Oslo, Norway

(4) Cystic Fibrosis Unit, Hippokraton General Hospital, Aristotle University of Thessaloniki, Thessaloniki, Greece

(5) Department of Pediatrics and CF Center, Hebrew University Medical School, Hadassah Medical Center, Jerusalem, Israel

(6) Institut Necker Enfants Malades. INSERM U-1151. Université Paris Cité. Paris France

(7) Centre de Référence Maladies Rares Mucoviscidose et Maladies Apparentées. Hôpital Necker Enfants malades, Paris, France

CORRESPONDING AUTHOR: Orenti Annalisa, [annalisa.orenti@unimi.it](mailto:annalisa.orenti@unimi.it)

## INTRODUCTION

Cystic fibrosis (CF) is the one of the most common severe genetic disease in the world. Although advances in care have positively affected CF outcomes, both in terms of lung function and survival in higher-income countries (HIC), the situation remains alarming in lower-income countries (LIC) [1,2].

## AIMS

This study aims in comparing characteristics of pwCF and their clinical outcomes in European countries with different income and to compare the situation before and after the introduction of CFTR modulators, a new class of drugs that completely transformed the landscape of CF.

## METHODS

PwCF carrying the F508del mutation on at least 1 allele enrolled in the European Cystic Fibrosis Society Patient Registry (ECFSPR) were evaluated in 2017 and in 2022 according to 3 groups created by terciles of the gross national income (GNI) per capita of European countries included in the study (Low Income Countries -LIC-, Middle Income Countries -MIC-, High Income Countries -HIC-) for predicted percent forced expiratory volume (ppFEV1), underweight, and chronic *Pseudomonas aeruginosa* (Pa) infection. Survival was evaluated in 2013-2017 and 2018-2022. Generalised linear models

and Cox regression models were fitted. Prediction of the median survival age were obtained from the regression model, according to the values of the covariates.

## RESULTS

From the 31,723 pwCF reported in ECFSPR in 2022, 13.5% lived in LIC, 19.9% in MIC, and 66.6% in HIC. pwCF living in LIC had a significantly lower median survival age, reduced ppFEV1, higher prevalence of Pa infection and underweight compared to pwCF from MIC and HIC. Although some improvements have been observed between 2017 and 2022 in all country groups, the gap between lower and higher income countries became even larger in recent years, after the introduction of CFTR modulator.

Data modeling indicated that the effect of the country group almost "disappear" in the adjusted regression model, indicating that in an ideal situation where underweight status, chronic *Pseudomonas Aeruginosa* infection, use of CFTR modulator is the same among different countries, also their median survival age will be the same. Model prediction showed that avoiding underweight and Pa infection would increase survival by 42 years for pwCF living in LIC. Access to CFTR modulators would further increase their survival by 15 to 29 years depending on their nutrition and infection status, resulting in a survival up to 82 years in the best case scenario.

## CONCLUSIONS

Big differences of survival in pwCF are observed according to the country where they live. The reduced survival of PwCF living in LICs can be improved with improvement in standard of care, such as optimal nutrition, anti-infectious care, access to CFTR modulators.

## REFERENCES

1. Kerem E., Orenti A., Adamoli A. et al., Cystic fibrosis in Europe: improved lung function & longevity: reasons for cautious optimism, but challenges remain. *European Respiratory Journal*, 2024; 63: 2301241.
2. McKone E.F., Ariti C., Jackson A. et al., Survival estimates in European cystic fibrosis patients and the impact of socio-economic factors: a retrospective registry Cohort study. *European Respiratory Journal*, 2021; 58: 2002288.