Effect of socio-economic status on lung function in the UK cystic fibrosis population

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Background

The rate of decline of FEV1 in people with cystic fibrosis is one of the most important predictors of death.

Low socioeconomic status has been linked with poor outcomes in CF in the US.

We have explored, for the first time in a UK-wide cohort, longitudinal rate of decline in FEV1 and its relationship with socioeconomic status (SES) and other risk factors.

Methods

We undertook a retrospective longitudinal cohort study of 3587 people with cystic fibrosis aged less than 20 years, and explored relationships between predicted FEV1 and SES, demographic characteristics, genotype and other clinical characteristics using the UK CF registry between 1995 and 2006.

Mixed model linear regression analysis was used to estimate the effect of fixed and time-varying covariates on the outcome mean % predicted FEV1 at age five (intercept) and the rate of lung function decline (slope).

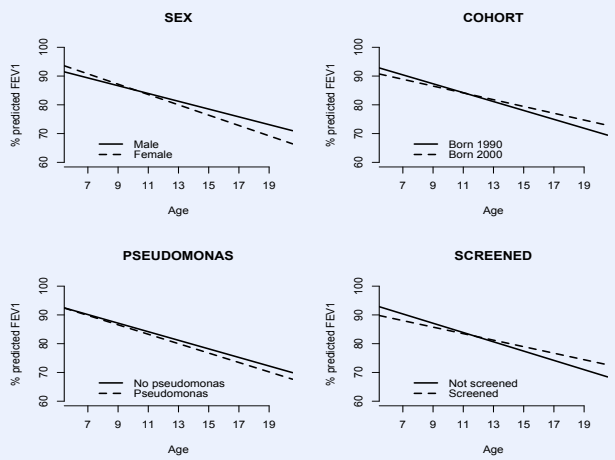
Census based indices of multiple deprivation (IMD) linked to postcodes from the UK constituent counties were used as small area exposure measures of SES.

Equal distribution across deprivation quintiles

Deprivation quintile	1 (least deprived)	2	3	4	5 (most deprived)
N (%)	707 (19.7)	692 (19.3)	699 (19.5)	763 (21.3)	726 (20.2)
Age at diagnosis (yrs)	1.5	1.4	1.5	1.6	1.5
Female (%)	329 (46.5)	317 (45.8)	312 (44.6)	356 (46.7)	347 (47.8)

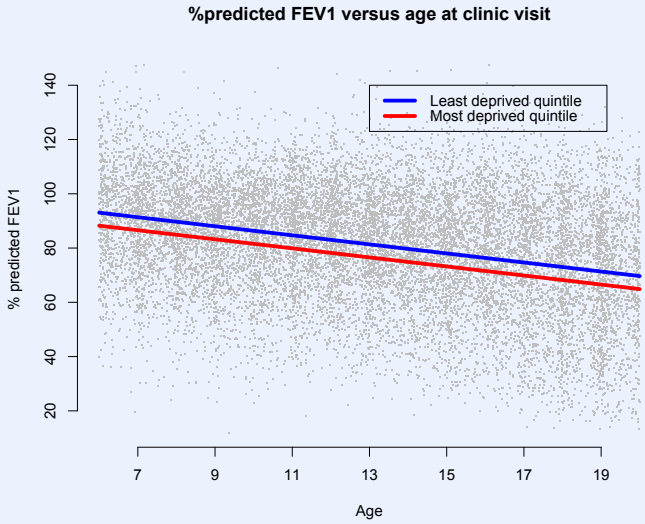
Final sample comprised of 15, 638 measures on 3587 individuals. IMD scores used to allocate each individual to a normative deprivation quintile.
There is a similar age at diagnosis and sex ratio across quintiles. CF does not appear to discriminate by SES in terms of incidence.

Sex and cohort effect corroborate previous studies



Steeper decline in lung function associated with female sex, later birth cohorts, pseudomonas colonization and individuals not screened for CF

Social deprivation in the UK associated with worse lung function at age five and subsequently



Difference in population mean FEV1 between most and least deprived is -4.71% 95%CI -7.8 to -1.5 (unadjusted) or -4.23% (95%CI -7.39 to -1.1) (adjusted for covariates). No significant difference in rate of decline.

Unadjusted effect of other covariates on %predicted FEV1

Covariate		Point estimate	Lower 95%CI	Upper 95% CI	P-value
Female	Intercept	2.298	0.397	4.200	0.018
Female	Slope	-0.442	-0.655	-0.229	0.000
10 year cohort	Intercept	-2.271	-4.477	-0.066	0.044
10 year cohort	Slope	0.371	0.125	0.618	0.003
Most deprived quintile	Slope	-4.713	-7.888	-1.539	0.004
Pseudomonas	Slope	-0.924	-2.166	0.317	0.144
Pseudomonas	Intercept	-0.147	-0.280	-0.013	0.032
Cepacia	Slope	-3.259	-5.140	-1.378	0.001
Supplemental feed	Intercept	-0.433	-1.645	0.778	0.483
Supplemental feed	Slope	-0.145	-0.279	-0.011	0.034
CFRD	Intercept	-8.471	-12.680	-4.261	0.000
CFRD	Slope	0.503	0.125	0.881	0.009
Pancreatic enzymes	Intercept	-1.231	-2.411	-0.051	0.041
No allele 1	Intercept	1.680	-2.436	5.796	0.424
No allele 2	Intercept	2.238	-1.745	6.222	0.271
Not typed	Intercept	-2.797	-9.491	3.898	0.413
No allele 1	Slope	-0.157	-0.593	0.279	0.481
No allele 2	Slope	-0.415	-0.834	0.004	0.052
Not typed	Slope	-0.131	-0.786	0.524	0.695
Screened	Intercept	-3.277	-5.965	-0.590	0.017
Screened	Slope	0.482	0.178	0.785	0.002
White	Intercept	4.537	1.137	7.936	0.009

Conclusions

In the context of a universal healthcare system more deprived populations in UK have a lower mean %FEV1 at age five, but there is no difference in the rate of decline subsequently

Events in early life are determining the effect of SES on lung function when first measured at age five

Longitudinal studies are required to explore mechanisms and mediating factors, and identify possible interventions

Acknowledgements DTR (dctr@liv.ac.uk) is supported by an MRC Population Scientist Award