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| **Validation studies of spirometry reference equations under-represent at-risk populations.** |
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| **Introduction/Aim:** Spirometry reference equations account for normal variation in lung function with age, height, and sex, and provide predictions based on populations of healthy, non-smokers. Lung function varies within and between populations due to multiple factors, the complex interactions of which are not well understood. Multi-ethnic spirometry reference values (Global Lung Function Initiative, GLI-2012) attempted to account for the differences in ‘healthy’ lung function between populations, however the use of ethnicity in lung function prediction is increasingly questioned. We aimed to assess the factors associated with the quality of GLI-2012 model fit in validation studies across population groups.  **Methods:** Literature was systematically searched for GLI-2012 validation studies in healthy, lifetime non-smoking participants. Inclusion criteria included model performance assessed in z-scores and/or %< lower limit of normal. Factors associated with model fit were analysed using generalised linear mixed models.  **Results:** 51 publications were included in the final analysis, representing 70 population groups across 37 countries. Overall, 41% of studies found appropriate GLI-2012 model fit. The age group of participants and the GLI-2012 ethnic equation used were significantly associated with increasing z-score deviation from zero and poorer model fit. GLI-Caucasian validation studies were over-represented (47% of total) with 85% concluding appropriate model fit. GLI-Other was assessed in 23% of studies and appropriate model fit found in 25%. Populations from countries with high to very high human development indexes accounted for 83% of studies. Countries with lower access to clean cooking fuels and technologies were associated with poor model fit in females, and countries with high prevalence of tobacco use were associated with poor model fit in males.  **Conclusion:** Further studies are needed in under-represented populations and in diverse contexts to improve our understanding of normal lung function especially in at-risk populations.        **Grant Support:** |