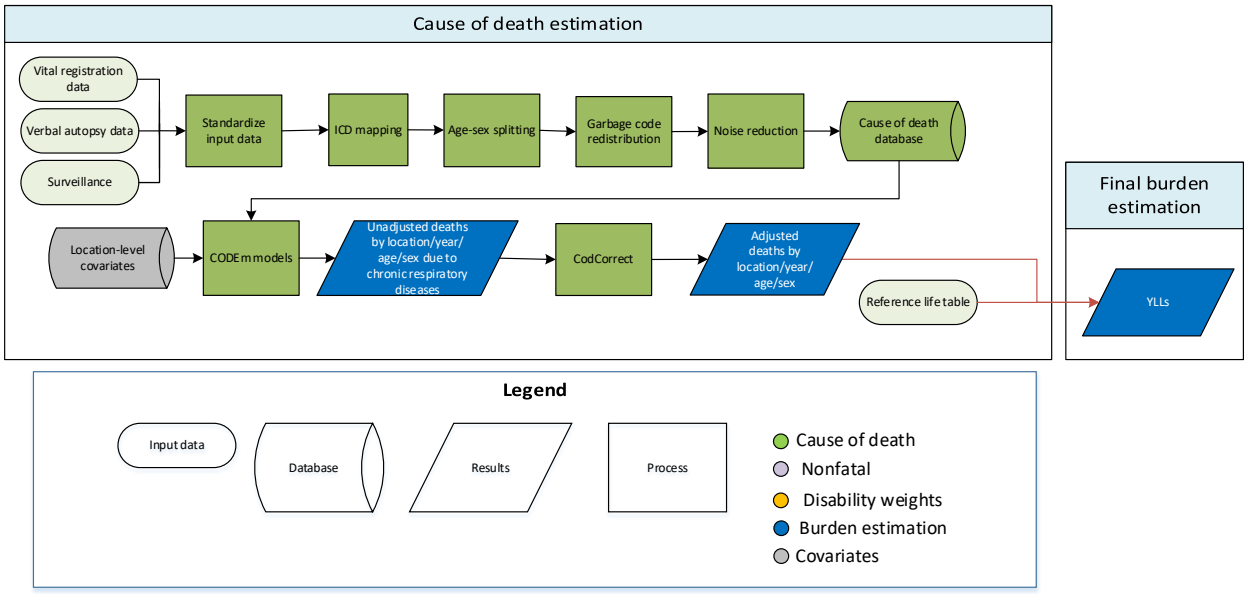
Chronic respiratory diseases



Input data

Sources used to estimate chronic respiratory disease mortality included vital registration, verbal autopsy, and surveillance data from China. Our outlier criteria excluded datapoints that (1) were implausibly high or low, (2) substantially conflicted with established age or temporal patterns, or (3) significantly conflicted with other data sources conducted from the same locations or locations with similar characteristics (ie, Socio-demographic Index).

Modelling strategy

There were no substantive changes to the modelling approach this round. The standard Cause of Death Ensemble modelling (CODEm) [1] approach (detailed in reference appendix section 3.1) was used to estimate deaths due to chronic respiratory diseases. Separate models were conducted for male and female mortality, and the age range for both models was 1 to 95+ years.

The following table lists the covariates included in the model. This requires that the covariate selected for the model must have the directional relationship with chronic respiratory deaths. For GBD 2020, no significant updates were made covariate selections. Covariate directions were selected based on the strength of the evidence.

Level	Covariate	Direction
1	Indoor air pollution (all cooking fuels)	+
	Cumulative cigarettes (10 years)	+
	Cumulative cigarettes (5 years)	+

	Smoking prevalence	+
2	Healthcare Access and Quality Index	-
	Outdoor air pollution ($PM_{2.5}$)	+
	Population above 1500 m elevation (proportion)	+
3	LDI (I$ per capita)	-
	Education (years per capita)	-
	Socio-demographic Index	-
	Population between 500 and 1500 m elevation (proportion)	+
	Population density over 1000 people/kilometer^2 (proportion)	+

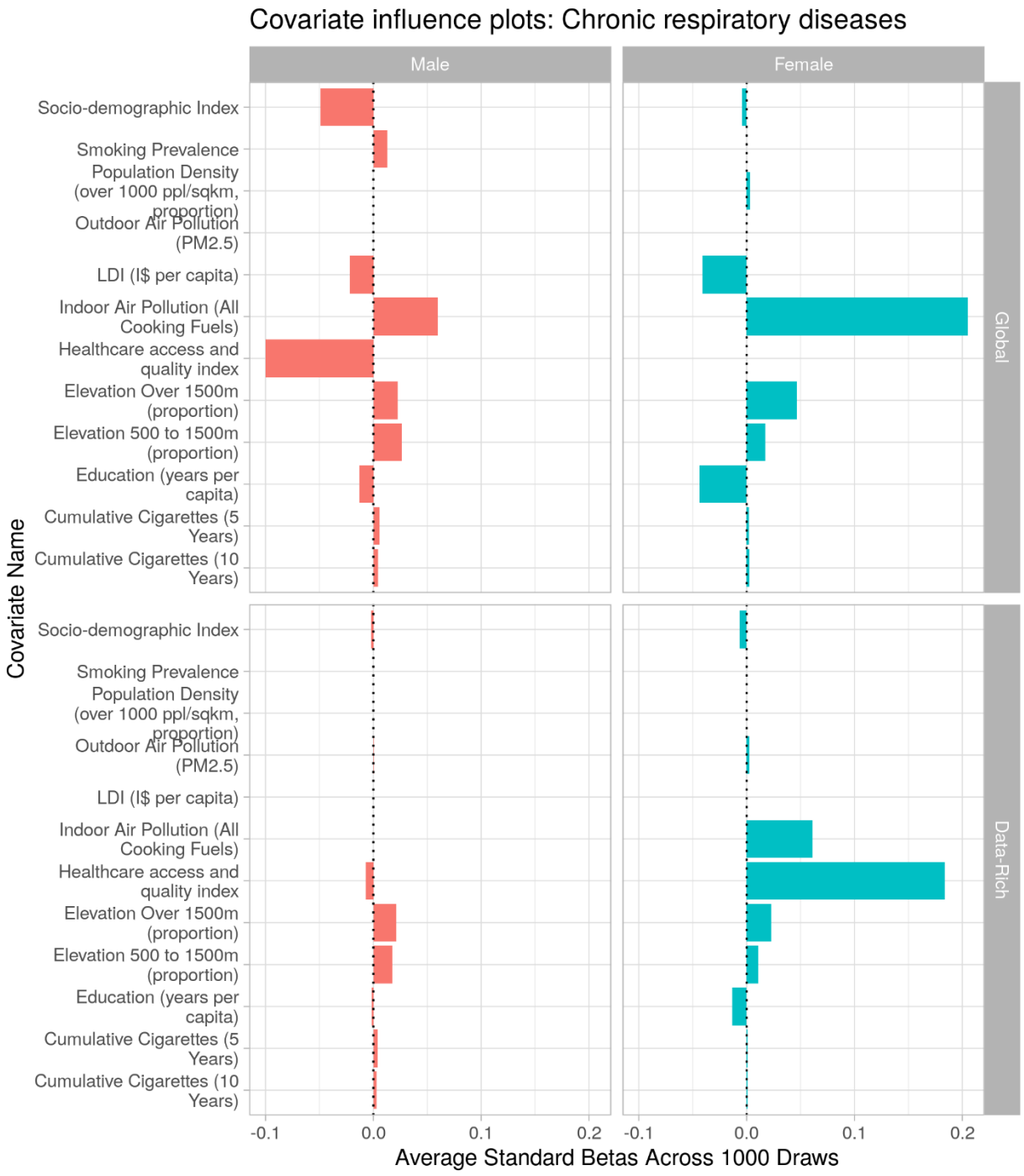
Chronic respiratory diseases served as an envelope to the following causes:

- chronic obstructive pulmonary disease
- pneumoconiosis (silicosis, asbestosis, coal worker's pneumoconiosis, other pneumoconiosis)
- asthma
- interstitial lung disease and pulmonary sarcoidosis
- other chronic respiratory diseases

The unadjusted death estimates for all these individual chronic respiratory disease causes are summed and fit to the distribution of deaths estimated for the envelope during the CoDCorrect adjustment process. This results in deaths recorded using non-specific coding systems, such as verbal autopsy, being included in the parent model and redistributed to the child models proportionately. This approach assumes that deaths reported in non-specific data sources have the same underlying distribution of specific causes as deaths reported in more specific data sources.

Covariate influences

The following plots show the influence of each covariate on the four CODEm models (male global, male data-rich, female global, and female data-rich). A positive standardised beta (to the right) means that the covariate was associated with increased death. A negative standardised beta (to the left) means the covariate was associated with decreased death.



[1]Vos T, Lim SS, Abbafati C, *et al.* Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet* 2020; **396**: 1204–22. doi: https://doi.org/10.1016/S0140-6736(20)30925-9