

# Scottish Burden of Disease (SBOD) study

Measuring COVID-19 DALYs for the first calendar year, 2020

**Grant Wyper**  
Public Health Intelligence Adviser

**@GMAWyper**  
**#ScottishBurdenOfDisease**



# Background and aim

- Disability-adjusted life years (DALYs) estimated by the Scottish Burden of Disease study for over 100 causes of disease and injury
- Integration of COVID-19, to allow for comprehensive, and comparable scaled assessments of direct and indirect pandemic harms
- Study aims
  - To estimate DALYs due to COVID-19, as a cause of disease, during the first calendar year
  - To frame COVID-19 relative to pre-pandemic causes of disease/injury
  - To assess socioeconomic inequalities in COVID-19 DALYs



# Methodology

- Consistency with core Scottish Burden of Disease study (132 causes)
  - Outcome based DALYs (not pathogen)
    - Acute infection
    - Post-acute consequences (fatigue, emotional lability)
  - Use of routine morbidity and mortality data consistent with other causes
    - Stronger infection data than previously
    - Provisional cause of death data used with sensitivity (COVID-19 as main cause vs. COVID-19 as any cause)
- Methodology developed in collaboration with European Burden of Disease Network
  - Morbidity – [Wyper et al. 2020](#)
  - Mortality (GBD aspirational life table) – [Devleesschauwer et al. 2020](#)



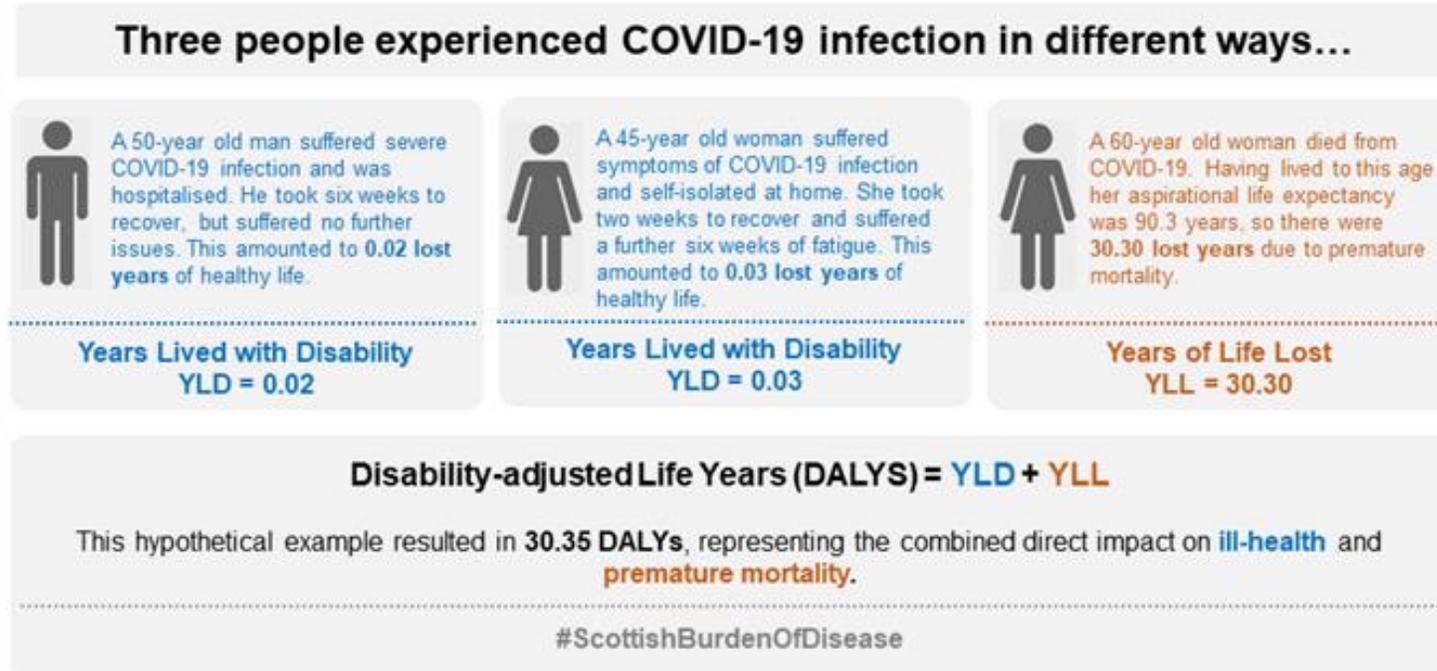
# Data inputs

- Morbidity
  - Severe and critical infections estimated from daily data on hospitalisations (with/without intensive care)
  - Transmission model used to estimate the number of daily community infections, and total number of people infected
  - Daily data allowed us to avoid assumptions over duration, as YLD was calculated on a daily basis – although crude durations: all cases (~8 days), hospitalised cases (~15 days)
- Mortality
  - Provisional cause of death data, based on date of death – few weeks lag
  - Data is highly credible, and unlikely to change when causes of death are finalised, as main changes occur for external (suicide, drug-related etc.) causes of death
  - Consistent with how mortality is estimated in core SBOD



# Making our methodology accessible for users

- Plain English communication via infographics and social media, supported by links to scientific papers for rigor and detail of methods



References: [1] <https://www.scotpho.org.uk/comparative-health/burden-of-disease/sbod-covid-19/>  
[2] <https://twitter.com/GMAWyper/status/1374666105256620032>

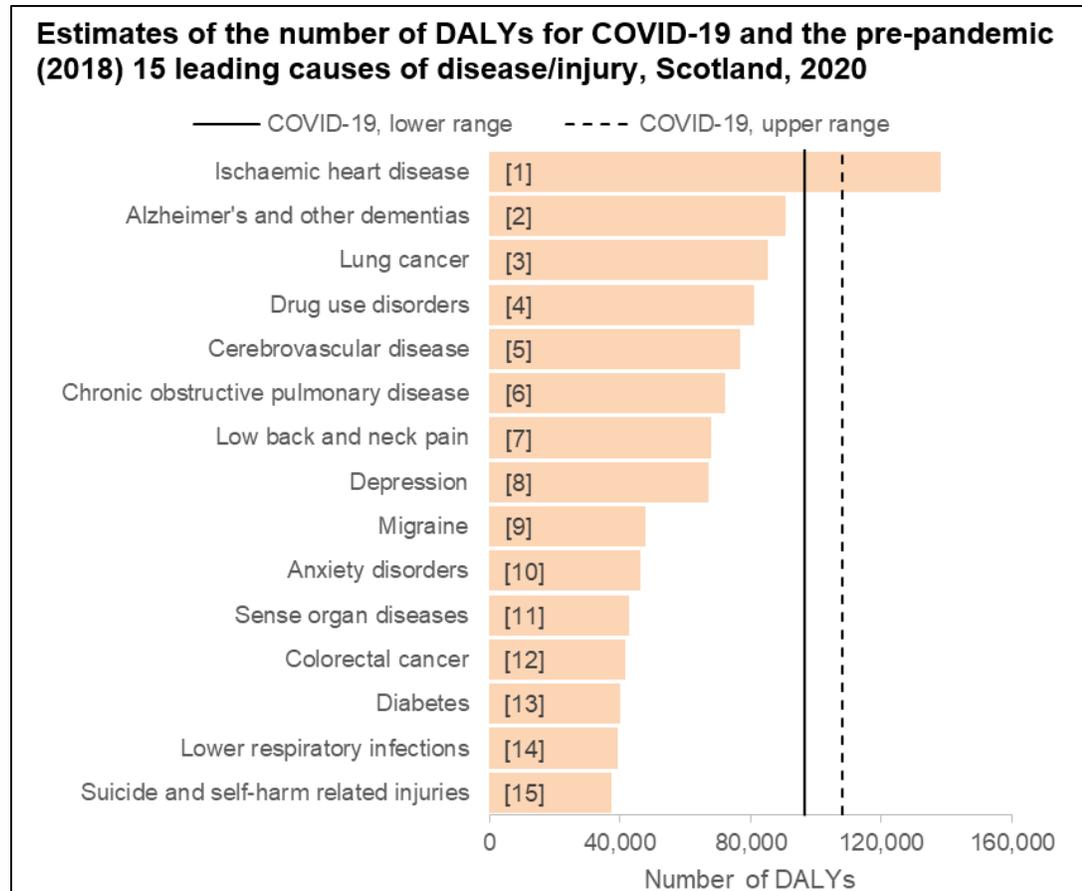


# Findings – COVID-19 burden assessment

- 1,767 to 1,981 DALYs per 100k in Scotland, 2020 (N = 96,519 – 108,243)
- 15.3 to 15.5 YLL per death
- Post-acute consequences (uncertain assumptions) were the largest contributor to YLD, followed by community-based infections
- YLL contributed 98% of all DALYs



# Findings – overall impact *cf.* pre-pandemic causes



- Upper and lower limits indicate COVID-19 likely to have been second leading cause in 2020
- Consistent across all sensitivity analyses
  - Community infection undercount
  - Transition/duration of post-acute consequences
  - GBD and SBOD estimates of other causes
- Changes in competing causes of death during 2020, unlikely to majorly impact this framing:
  - Respiratory (▼)



# Conclusions

- Devastating impact – a single case in March 2020, to second leading cause of disease/injury in 2020
- Expect that a high proportion of these DALYs are attributable to prior risk factors
- Need for a healthier society, as a means of achieving DALY reduction for COVID-19 and other future epidemics/disasters
- SBOD will continue to monitor COVID-19, and all other health conditions to estimate the largest contributors of disease, injuries and risk on population health.



# Transferable learning

- Estimation for 2021 should indicate indications of the positive impact of DALYs averted due to vaccine rollout, and other continued mitigation efforts
- YLL is a close proxy for DALYs, so scrutiny over comparability of approaches to mortality assessment is of the greatest importance (for outcome-based DALYs, with COVID-19 as a cause)
- DALYs offer the opportunity to capture and monitor the weighted impact of the pandemic
  - COVID-19 infection
  - Post-acute clinically-related COVID-19 harms
  - Post-acute harms due to increased vulnerability following COVID-19
  - Indirect harms due to pandemic related restrictions (restrictions to vital services etc.)



# Acknowledgements

- Contributors to the Scottish COVID-19 DALYs assessment
  - Eilidh Fletcher, Ian Grant, Gerry McCartney, Colin Fischbacher, Oliver Harding, Hannah Jones, Maria Teresa de Haro Moro, Niko Speybroeck, Brecht Devleesschauwer, Diane Stockton
- [Scottish Burden of Disease study – COVID-19](#)
- [Burden-eu burden of disease COVID-19 resource webpage](#)

