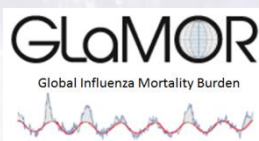




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The epidemiological signature of seasonal influenza-related mortality

WHO-funded GLaMOR project

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Background

- WHO estimates that seasonal influenza causes roughly 250,000-500,000 deaths annually around the world
- The GLaMOR II project was funded by WHO to update these estimates

Methods

- GLaMOR II employs a two-stage approach (Simonsen et al, PlosMedicine, 2013)
- In Stage 1, we use multivariate time series models to estimate mean seasonal excess mortality over multiple years (weekly respiratory mortality data)
- In Stage 2, we use a multiple imputation model that weighs 10 demographic factors to project the mortality burden in each of the world countries.
- Using the imputed single-country values we estimated the global and regional numbers
- The Stage 1 and 2 analyses were performed for the under 65 and over 65 age groups to obtain age stratified estimates

Results

We have Stage 1 estimates for 32 countries around the world (55% of the world population) for the period 2002-2008 (7 seasons). The Table summarizes the findings by region and age group.

	Average seasonal number of influenza-related respiratory deaths	Range (lowest to highest year)	Average seasonal influenza-related respiratory mortality rate (per 100,000)	Range (lowest to highest year)	Percent over 65	Range (lowest to highest year)
World	435,400	268,000 - 577,200	6.8	4.2 - 9.0	63%	52 - 71%
Africa	57,500	32,600 - 90,100	8.0	4.6 - 12.6	30%	16 - 41%
Americas	69,300	40,800 - 100,200	7.8	4.6 - 11.3	74%	63 - 79%
Europe	49,900	36,700 - 59,200	5.7	4.2 - 6.7	83%	80 - 86%
South Eastern Asia	107,700	50,700 - 162,800	5.5	3.0 - 9.6	55%	48 - 64%
Eastern Mediterranean	26,100	16,900 - 35,000	5.0	3.3 - 6.7	49%	32 - 60%
Western Pacific	86,400	56,200 - 105,800	5.0	3.2 - 6.1	67%	61 - 76%

- Influenza-related respiratory mortality rates were 10-30 times higher in the over 65 than in under 65 year olds, depending on the world region
- Sensitivity analyses showed that the two African countries with available Stage 1 data (Kenya and South Africa) carry a large weight in the extrapolation model and increase global and some regional annual estimates (e.g. Africa and Eastern Mediterranean) by more than 25%
- Excluding Kenya from the analysis (Stage 1 estimates for 2007 and 2008) only reduced the overall annual estimate over the six year period to 396,700 (range 268,000 to 524,800)
- These are not the final estimates as we are still evaluating the Stage 1 data, especially the 65+ estimates where there is great variability (even between neighbouring countries)

Conclusions

Our estimates of 268,000 to 577,200 influenza-related respiratory deaths per annum during 2002-2008 displayed substantial variability by year, age group and geographic region.

Our results align with the widely quoted WHO estimates, however they include only influenza mortality attributable to respiratory causes, and influenza's total impact on all-cause mortality may be as much as twice as high.



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