

# Comparing approaches in modelling 2020 overall mortality by sex and age

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## AIM

Estimate 2020 mortality by age and sex for pop. with no data

# The two approaches

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  - ① empirical ratio between mortality in 2019 and 2020 for population with both information
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  - ① for a given population with both information within a cluster  $k$ :

$$\eta^{2020}(x) = \eta^{2019}(x) + c + \delta^k(x)$$

with  $\eta(x)$  and  $\delta^k(x)$  assumed to be smooth and  $\sum \delta^k(x) = 0$

- ② apply cluster-specific age-factor  $\delta^k(x)$  to population with no information in 2020
- ③ (uncertainty still to be included)



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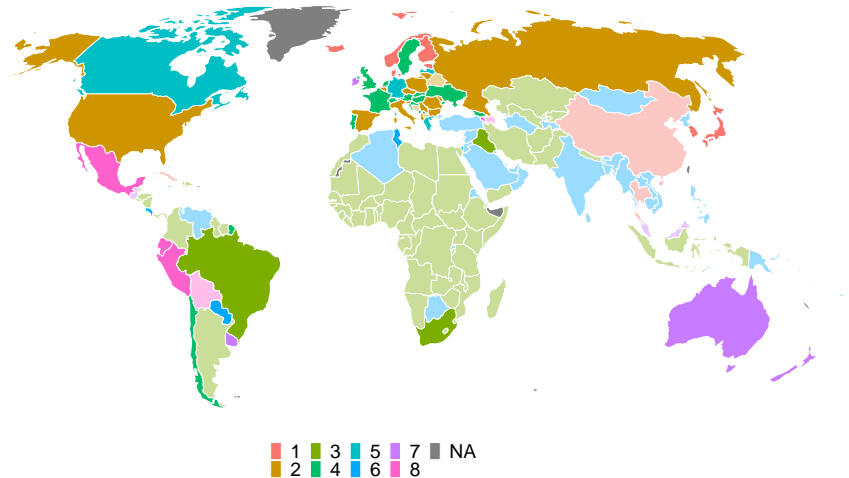
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- Final common step: redistribution of estimated 2020 deaths to match “known” overall excess mortality deaths

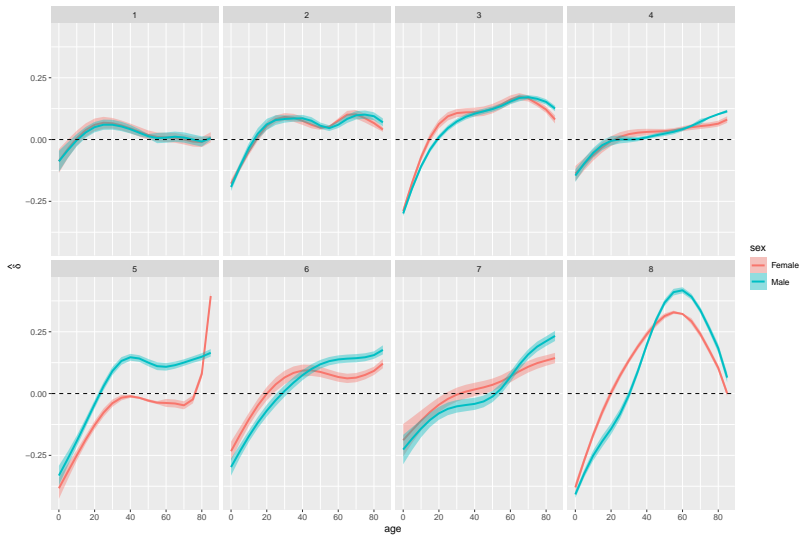
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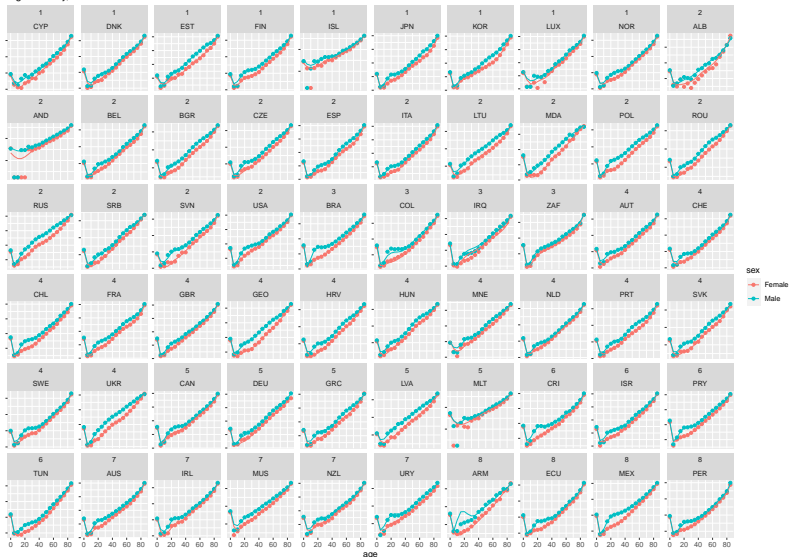
Cluster	pop w/ data	# pop w/ data	# pop w/o data	% of pop. w/ data
1	CYP,DNK,EST,FIN,ISL, JPN,KOR,LUX,NOR	9	4	69%
2	ALB,AND,BEL,BGR,CZE, ESP,ITA,LTU,MDA,POL,ROU, RUS,SRB,SVN,USA	15	4	79%
3	BRA,IRQ,ZAF,COL	4	65	6%
4	AUT,CHE,CHL,FRA,GBR, GEO,HRV,HUN,MNE,NLD, PRT,SVK,SWE,UKR	14	0	100%
5	CAN,DEU,GRC,LVA,MLT	5	1	83%
6	CRI,ISR,PRY,TUN	4	51	7%
7	AUS,IRL,MUS,NZL,URY	5	7	42%
8	ARM,ECU,MEX,PER	4	2	67%
<b>Totals</b>		60	134	31%

# Cluster-specific $\delta(x)$



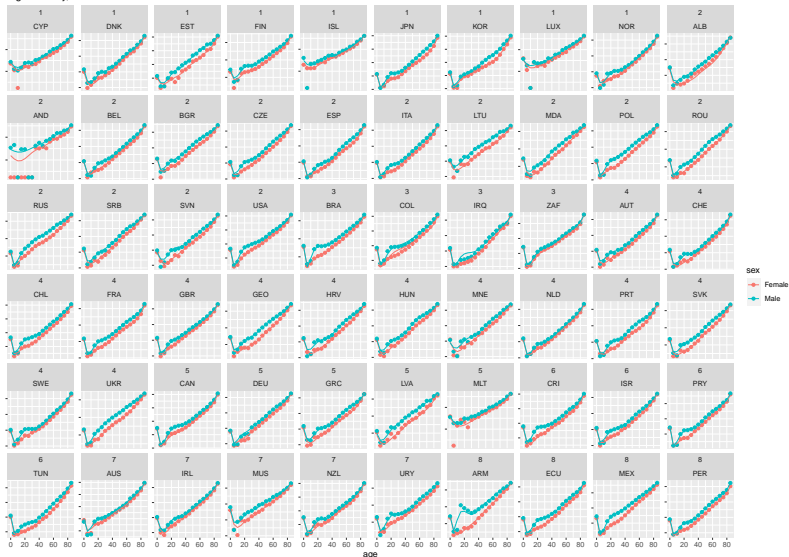
# Log-mortality in 2019: in-sample fit

log-mortality, 2019

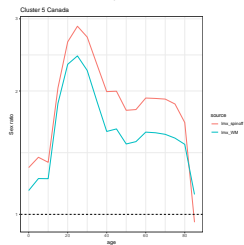
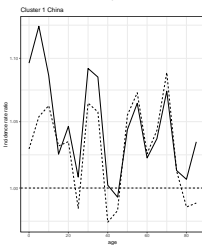
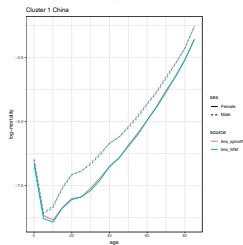
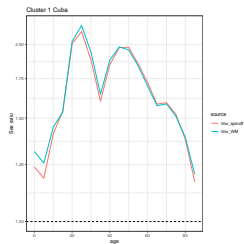
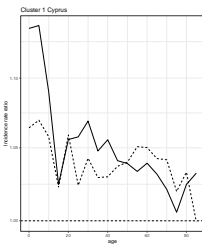
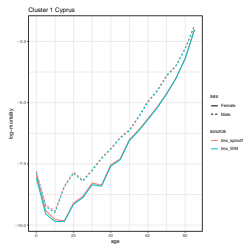


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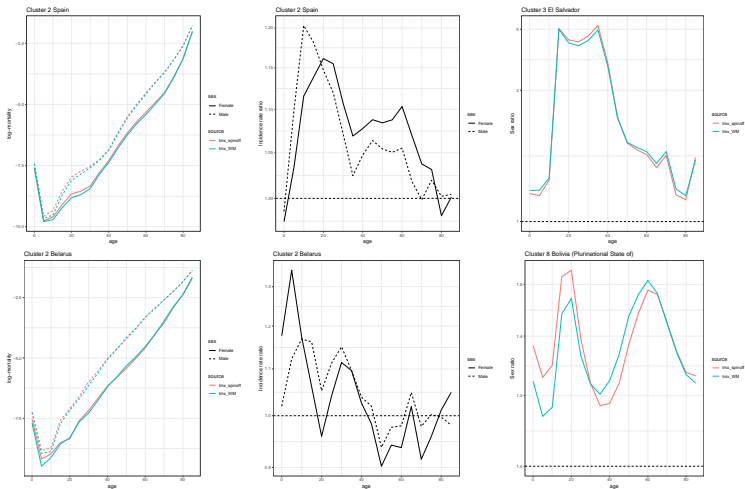
log-mortality, 2020



# Out-of-sample comparison, Cluster 1 (69%)

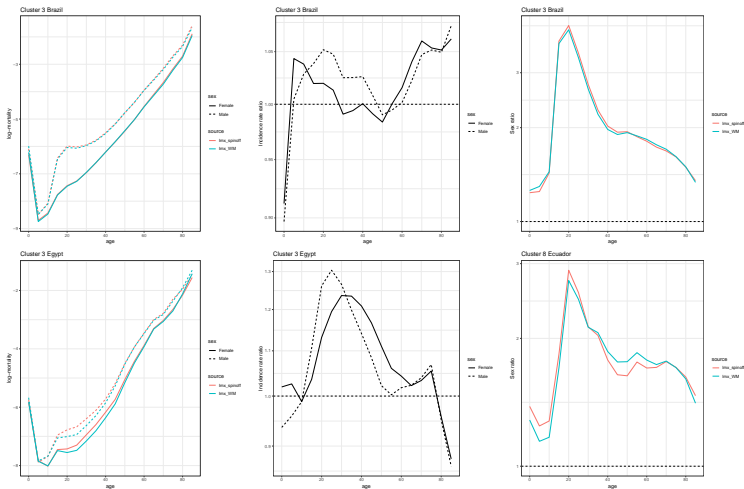


# Out-of-sample comparison, Cluster 2 (79%)

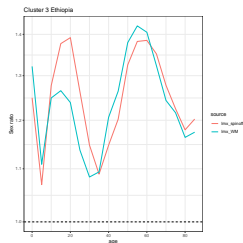
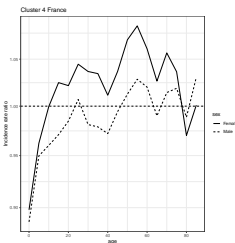
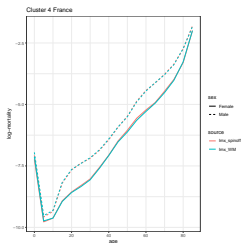




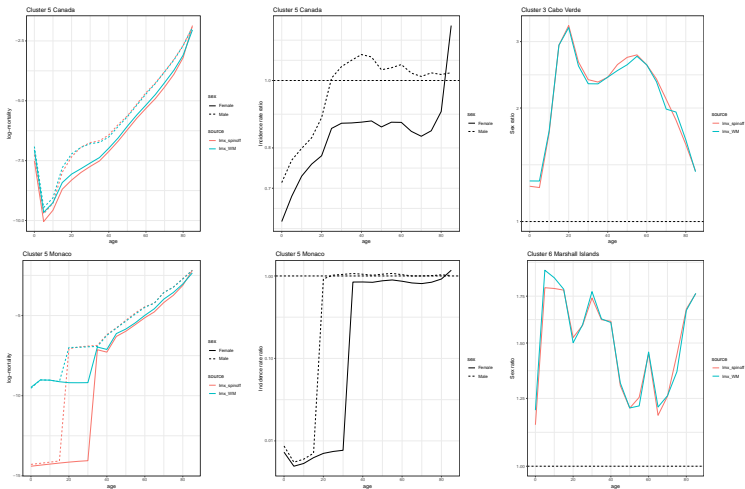
# Out-of-sample comparison, Cluster 3 (6%)



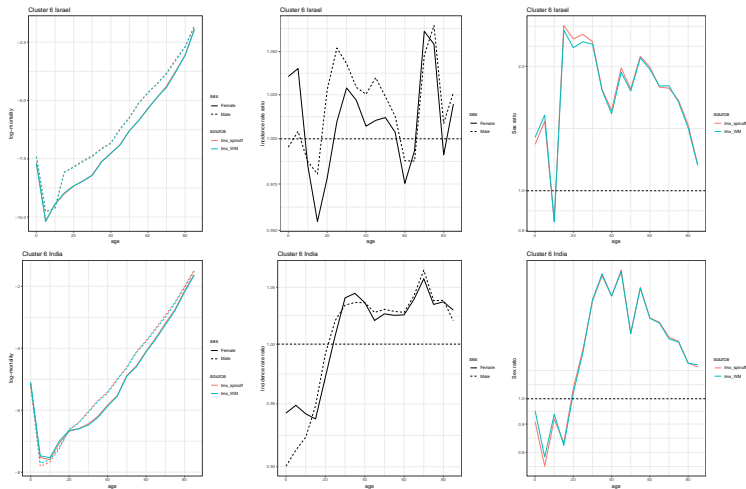
# Out-of-sample comparison, Cluster 4 (100%)



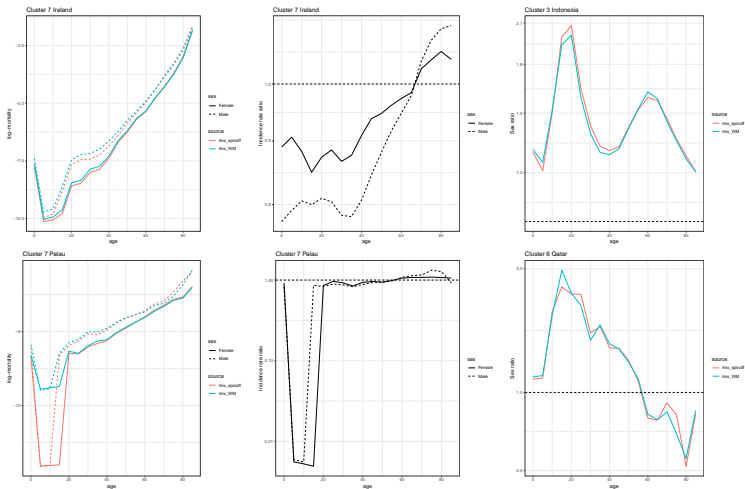
# Out-of-sample comparison, Cluster 5 (83%)



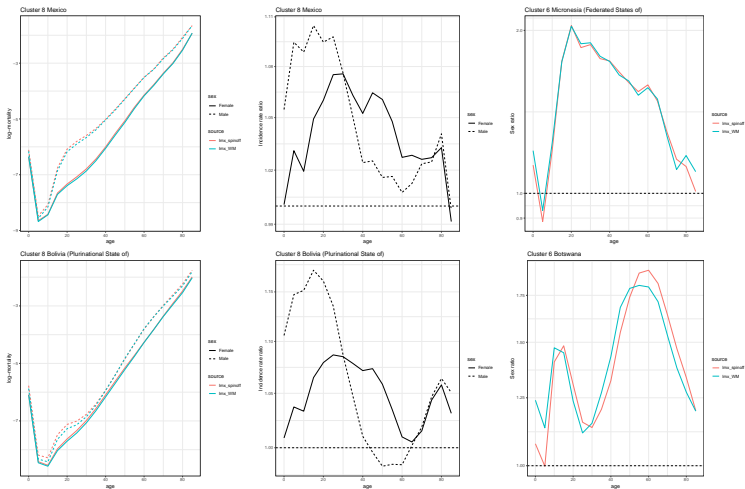
# Out-of-sample comparison, Cluster 6 (7%)



# Out-of-sample comparison, Cluster 7 (42%)



# Out-of-sample comparison, Cluster 8 (67%)



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- *Something else from your side?*