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COMMENTARY

Standard Expected Years of Life Lost as a Neglected Index for Calculating the Burden of Premature Mortality due to Middle East Respiratory Syndrome

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This study presents standard expected years of life lost due to premature mortality for calculating the burden of laboratory-confirmed MERS-CoV cases that have occurred from January 1, 2018, to March 31, 2019, worldwide. The study used a publicly available MERS-CoV database on the WHO website regarding case reports retrieved from disease outbreak news.

Keywords: Standard expected years of life lost, Burden of premature mortality, Middle East respiratory syndrome

Mortality rates such as case fatality rate, disease- or cause-specific mortality rate, and proportionate mortality have frequently been used to determine the relative importance of different causes of death and to estimate the extent of a public health problem.[1,2] Although all of these indexes are useful and important in estimating health status, they often fail to calculate the overall burden of premature mortality related to a common or rare disease in certain populations. One of the popular indexes for estimating the burden of disease is disability-adjusted life years (DALYs). This index is based on standard expected years of life lost due to premature mortality (SEYLL) and years lost due to disability (YLD). An index of disability-adjusted life years is the sum of standard expected years of life lost and years lost due to disability. Because the latter is generally difficult to measure, owing to often poor disability data, standard expected years of life lost is sometimes reported alone, as it is based on mortality, which in most countries is reasonably well documented.[3] In recent years, standard expected years of life lost as a component of disability-adjusted life years for quantifying the burden of disease is increasingly being used to set priorities and guidelines regarding health problems and to plan for health intervention programs.[1] Standard expected years of life lost is measured by subtracting the age at death and standardized life expectancy—the highest level of standard life expectancy in 2000 belongs to men (with 80 years expected lifespan) and women (with 82.5 years expected lifespan) from Japan, based on levels 25 and 26 of the West model from Coal and Demeny tables[4]—for the same age and the same sex, and, specifically, the set of lost life due to a disease in a community will be the simple addition of standard expected years of life lost for people who died in that community, using the following formula:

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$$\mathrm{SEYLL} = \sum \left(\mathrm{Ni}^{\mathrm{m}} \times \mathrm{Li}^{\mathrm{m}} + \mathrm{Ni}^{\mathrm{f}} \times \mathrm{Li}^{\mathrm{f}} \right)$$

Where Ni^{m} (Ni^{f}) was the number of deaths of male (female) in the age group; *i* multiplied by the standard life expectancy; Li^{m} (Li^{f}) of male (female) at the age at which death had occurred.

The researchers provided valuable information about the epidemiology and associated risk factors of Middle East respiratory syndrome coronavirus (MERS-CoV) infection,[5-8] but to the best of our knowledge, to date, the authors of all previously published studies of MERS-CoV have not calculated the burden of premature mortality related to MERS-CoV infection from various countries that were reported to the World Health Organization (WHO). In the present study, in addition to recalling this important index for calculating the burden of premature mortality in emerging diseases, we present standard expected years of life lost measures for laboratory-confirmed MERS-CoV cases worldwide from January 1, 2018, to March 31, 2019. The study used a publicly available MERS-CoV database of case reports retrieved from the disease outbreak news on MERS-CoV at the WHO website (https://www.who.int/csr/don/archive/disease/coronavirus_infections/en/).

The characteristics of 336 MERS-CoV cases can be found in Table 1. During the course of this study, we found that more of the global MERS cases were male (73.8%), with a positive history for having exposure to camels (58.3%) and exposure to other MERS-CoV cases (64.9%). Most of the MERS patients have been reported from Saudi Arabia (92%), with ages between 30and 69 years old. Also, 69.6% of the MERS cases had a comorbidity. The overall case fatality rate in MERS patients was 87 of 336 (25.8%). ◀T1

The burden of premature mortality due to MERS-CoV infection in the 87 fatal MERS cases is summarized in Table 2. During the course of this study, the highest standard expected years of life lost rate was observed in the age group of ≥50 years old, among males, in the MERS cases reported from Saudi Arabia. Furthermore, rates were higher among those who had 1 or more comorbidity and positive exposure to camels and other morbid MERS-CoV cases. It is hoped that the present article will serve as a basis ◀T2

Table 1. Characteristics of 336 MERS-CoV Cases from January 1, 2018, to March 31, 2019 (from WHO data)[a]

Characteristics	*Levels*	*n*	*%*
Age groups	10-19	9	2.7
	20-29	25	7.4
	30-39	57	17.0
	40-49	52	15.5
	50-59	70	20.8
	60-69	62	18.5
	70-79	43	12.8
	80 and up	18	5.4
Gender	Male	248	73.8
	Female	88	26.2
Reporting country	KSA[b]	309	92.0
	Oman	15	4.5
	UAE[c]	7	2.1
	Qatar	3	0.9.
	Lebanon	1	0.3
	Malaysia	1	0.3
Healthcare worker	Yes	41	12.2
	No	295	87.8
Comorbidities	Yes	234	69.6
	No	102	30.4
Exposure to camels	Yes	196	58.3
	No	140	41.7
Camel milk consumption	Yes	130	38.7
	No	206	61.3
Exposure to MERS-CoV cases	Yes	218	64.9
	No	118	35.1
Final outcome	Died	87	25.9
	Alive	249	74.1

[a]Data in this table are an updated version of our data in a previously published article.[5]
[b]Kingdom of Saudi Arabia.
[c]United Arab Emirates.

Table 2. SEYLL Related to MERS-CoV Infection by Characteristics of 87 Who Died from MERS-CoV from January 1, 2018, to March 31, 2019 (per WHO data)

		2018 (n = *228*)		*2019* (n = *108*)		*Total (2018-2019)* (n = *336*)	
Characteristics	*Levels*	*Number of Deaths (%)*	*SEYLL*	*Number of Deaths (%)*	*SEYLL*	*Number of Deaths (%)*	*SEYLL*
Age groups	10-29	4 (5.7)	228.0	0 (0.0)	0.0	4 (4.6)	228.0
	30-49	7 (10.0)	275.0	6 (35.3)	259.5	13 (14.9)	534.5
	≥50	59 (84.3)	820.0	11 (64.7)	76.0	70 (80.5)	896.0
Gender	Male	55 (78.6)	1,172.0	12 (70.6)	179.0	67 (77.0)	1351
	Female	15 (21.4)	151.5	5 (29.4)	156.5	20 (23.0)	308.0
Reporting country	KSA[a]	69 (98.6)	1,274.5	13 (7.5)	214.5	82 (94.3)	1,489.0
	Oman	0 (0.0)	0.0	4 (23.5)	121.0	4 (4.6)	121.0
	UAE[b]	1 (1.4)	49.0	0 (0.0)	0.0	1 (1.1)	49.0
Healthcare worker	Yes	0 (0.0)	0.0	1 (5.9)	47.5	1 (1.1)	47.5
	No	70 (100.0)	1,323.5	16 (94.1)	288.0	86 (98.9)	1,611.5
Comorbidities	Yes	63 (90.0)	1,041.5	14 (82.4)	223.0	77 (88.5)	1,264.5
	No	7 (10.0)	282.0	3 (17.6)	112.5	10 (11.5)	394.5
Exposure to camels	Yes	47 (67.1)	888.0	10 (58.8)	153.5	57 (65.5)	1,041.5
	No	23 (32.9)	435.5	7 (41.2)	182.0	30 (34.5)	617.5
Camel milk consumption	Yes	28 (40.0)	586.5	10 (58.8)	153.5	38 (43.7)	740.0
	No	42 (60.0)	737.0	7 (41.2)	182.0	49 (56.3)	919.0
Exposure to MERS-CoV cases	Yes	44 (62.9)	765.0	11 (64.7)	251.0	55 (63.2)	1,016.0
	No	26 (37.1)	558.5	6 (35.3)	84.5	32 (36.8)	643.0

[a]Kingdom of Saudi Arabia.
[b]The United Arab Emirates.

for further epidemiologic research, and especially for calculating the burden of premature mortality due to the MERS-CoV infection.

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