

Human capital loss associated with ill-health: evidence from patients with end-stage kidney disease in Taiwan

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OBJECTIVES:

Developed a novel method to estimate the loss of lifetime employment durations(LED loss) and loss of lifetime productivity (LP loss) for end-stage kidney disease (ESKD) patients undergoing dialysis.

SUBJECTS & METHODS

A total of 83,358 patients with ESKD (i) diagnosed during 2000-2017 and aged between 25 and 64 years were identified from National Health Insurance (NHI) database and followed until 2018.

We estimated their lifetime survival function (Survival(t)) through iSQoL2 R package. Their monthly employment-population ratio (EMRATIO(t)) and insured earnings (earning(t)) were abstracted from National Health Insurance (NHI) until 2017 and were assumed 0 after 65 years old (conditional). We extrapolated them based on an association of ESKD's hazard and the employed status with a sex-, age-, and calendar year-matched referents (r) generated from NHI.

Lifetime Employment Duration (LED)

$$LED_{cohort} = \sum_{t=0}^L Survival(t|cohort) \times EMRATIO(t|cohort)$$

Loss of Lifetime Employment Duration (LLED)

$$LLED = LED_{ref} - LED_{index}$$

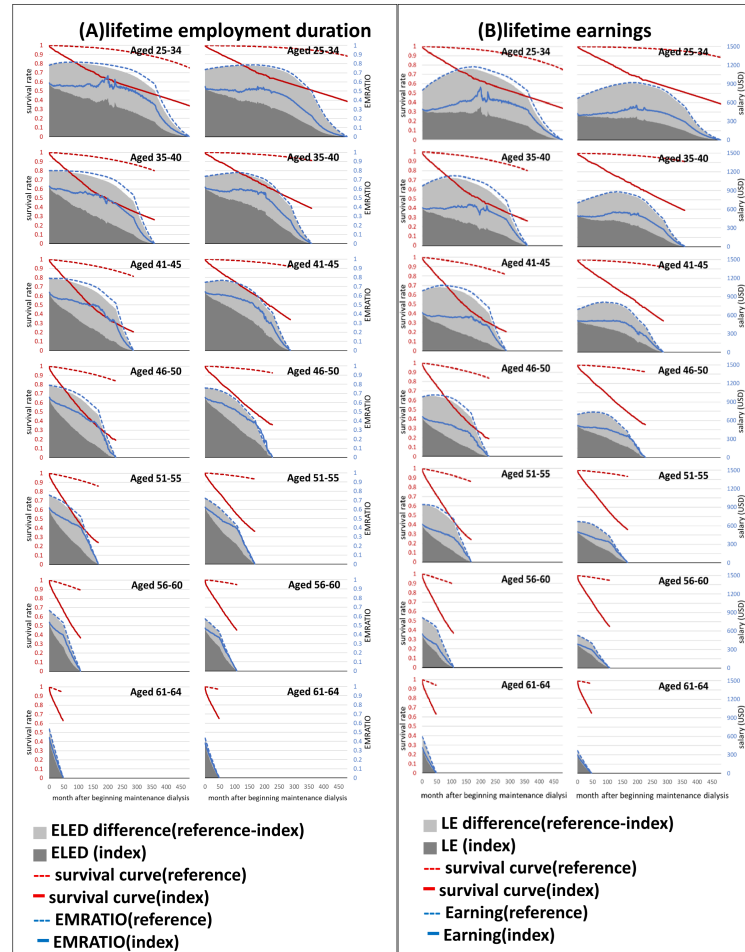
Lifetime Earnings (LE)

$$LE_{cohort} = \sum_{t=0}^L Survival(t|cohort) \times Earnings(t|cohort)$$

Loss of Lifetime Earnings (LLE)

$$LLE = LE_{ref} - LE_{index}$$

Figure: Expected (A)lifetime employment duration and (B)lifetime earnings of ESKD patients and the corresponding age-sex- and calendar year-matched referents stratified by age.



Group		Life expectancy (year)			Lifetime Employment Duration (year)			Lifetime Productivity (in USD)		
		Ref.	Ind.	Loss	Ref.	Ind.	Loss (%) ^a	Ref.	Ind.	Loss (%) ^b
		(A)	(B)	(C) =(A)-(B)	(D)	(E)	(F)=(D)-(E) a (F)/(D)	(G)	(H)	(I)=(G)-(H) b (I)/(G)
Women	Aged 25-34	54.0	31.5	22.5 (42%)	23.5	10.7	12.8 (54%)	311230	120035	191195 (61%)
	Aged 35-40	46.6	25.1	21.5 (46%)	17.6	9.8	7.8 (44%)	230081	107202	122879 (53%)
	Aged 41-45	41.4	19.1	22.3 (54%)	13.5	7.8	5.7 (42%)	171502	81621	89881 (52%)
	Aged 46-50	36.7	16.0	20.7 (56%)	9.8	6.1	3.7 (38%)	119905	61464	58441 (49%)
	Aged 51-55	32.1	12.1	20.0 (62%)	6.2	4.0	2.2 (35%)	73917	39243	34674 (47%)
	Aged 56-60	27.4	9.6	17.8 (65%)	3.0	2.0	1.0 (33%)	33474	19361	14113 (42%)
men	Aged 61-64	23.3	7.6	15.7 (67%)	0.8	0.6	0.2 (25%)	8391	5685	2706 (32%)
	Aged 25-34	47.9	28.7	19.2 (40%)	24.0	11.6	12.4 (52%)	387970	151637	236333 (61%)
	Aged 35-40	40.9	19.7	21.2 (52%)	18.1	8.1	10.0 (55%)	297409	109220	188189 (63%)
	Aged 41-45	35.8	14.7	21.1 (59%)	14.0	6.2	7.8 (56%)	225214	77449	147765 (66%)
	Aged 46-50	31.7	11.3	20.4 (64%)	10.4	4.9	5.5 (53%)	163907	58314	105593 (64%)
	Aged 51-55	27.5	9.6	17.9 (65%)	6.9	3.6	3.3 (48%)	106023	42222	63801 (60%)
	Aged 56-60	23.5	7.9	15.6 (66%)	3.5	2.0	1.5 (43%)	51958	23188	28770 (55%)
	Aged 61-64	19.9	7.0	12.9 (65%)	1.0	0.7	0.3 (30%)	13949	7777	6172 (44%)

RESULTS:

ESKD patients lost about 25-56% LED as well as about 32-66% lifetime productivity through adjustments for different age sex and calendar year. The older the ESKD patient the less lifetime productivity was lost.

CONCLUSION:

The loss of lifetime productivity would be a combined LLED because of increased premature mortality and functional disability and the loss related to presenteeism implied by the reduced wages.