

Accuracy of transferred medical costs: evidence from the Middle East and North Africa region

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Objectives

the scarcity of cost data is a barrier to health economic evaluations in Middle East and North Africa (MENA). We evaluated the accuracy of estimates when transferring medical costs within MENA via adjustment by GDP per capita (GDPpc).

Methods

we performed a systematic review of medical costs reported for local populations of Algeria, Bahrain, Egypt, Iraq, Jordan, Saudi Arabia, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Syria, Tunisia, United Arab Emirates and Yemen (PubMed, 1995-2019). From multi-country studies that employed homogenous costing methods, we estimated each cost item from the relative differences in costs and GDPpc via robust regression. We analysed the relative error (RE) of predictions via linear regression (log-RE, M₁) and logistic regression (RE<30%, M₂) using cost complexity (drug, unit, disease), country (A) or GDP per capita (B), relative difference of GDPpc between countries, number of available foreign costs, and cost sources (model, primary study, secondary sources) as predictors.

Results

From 3525 cost items (1646 records, 206 full text papers) we identified 142 eligible direct medical costs from 7 multi-country studies. Most accurate estimates were provided by adjusting mean available foreign costs by 0.284 times relative differences in GDPpc. 80% of true costs (10-90 percentile range) fell in the predicted cost -64% / +71% error range. Predictions were most accurate for drug costs (Models 1A, 1B, 2A, 2B), when GDPpc differences were big between countries (Models 1B, 2B) and when more foreign costs were available (Models 2A, 2B); and least accurate for Qatar and Syria (Models 1A, 2A) and for countries with higher GDP per capita (Models 1B, 2B) (p<0.05).

Conclusions

between MENA countries, medical costs vary proportionally to, but less than GDPpc. When transferring costs, matching costs should be collected from multiple countries, adjusted by GDPpc and used with wide (>75%) error margin in sensitivity analysis.

References

Zrubka Z, Péntek M, Mhanna L, Abu-Zahra Z, Mahdi-Abid M, Fgaier M, El-Dahiyat F, Al-Abdulkarim H, Drummond M, Gulácsi L: Disease-Related Costs Published in The Middle East and North Africa Region: Systematic Review and Analysis of Transferability, PharmacoEconomics 2022, accepted for publication

Cost transfer formula

$$Cost_t = \left(1 + 0.284 * \frac{GDPpc_t - mean\ GDPpc_{i \neq t}}{mean\ GDPpc_{i \neq t}} \right) * mean\ Cost_{i \neq t}$$

GDPpc: GDP per capita PPP\$, t: target country, i≠j: input countries excluding the target country. The formula applies only to situations where costs are collected with the same methods in the same costing year in multiple countries.

Regression analysis of the relative error of prediction

		Linear ^d Log-RE	Logistic ^e RE<30%,	Linear Log-RE	Logistic RE<30%,
		M ₁ A	M ₂ A	M ₁ B	M ₂ B
Cost complexity ^a	drug	-1.20**	2.95**	-1.54***	3.79***
	unit	0.16	-0.21	0.41	0.10
Country ^b	Algeria (DZA)	0.00	0.00		
	Bahrain (BHR)	0.19	-1.53		
	Egypt (EGY)	-0.32	15.15		
	Iraq (IRQ)	-0.30	15.06		
	Jordan (JOR)	0.20	15.66		
	KSA (SAU)	-0.17	-1.78		
	Kuwait (KWT)	0.64	-2.21		
	Lebanon (LBN)	0.27	15.57		
	Libya (LBY)	0.37	16.44		
	Morocco (MAR)	0.51	-0.22		
	Oman (OMN)	-0.94	15.42		
	Palestine (PSE)	-0.23	0.60		
	Qatar (QAT)	3.39**	-24.69		
	Syria (SYR)	0.81*	-0.67		
Tunisia (TUN)	-0.31	0.48			
UAE (ARE)	0.68	-1.97			
Yemen (YMD)	0.05	-0.15			
Relative GDPpc		-0.29	0.74	-0.40**	0.77*
Predictor countries	(N)	-0.08	0.38*	-0.08	0.45**
Source of costs ^c	Primary study	-0.68	0.20	-0.62	-0.04
	Secondary foreign	-1.11	0.52	-1.30	0.33
GPD per capita PPP\$				0.00*	-0.00***
Constant		0.11	-2.82**	-0.02	-2.25***
Observations		142	142	142	142

* p < 0.05, ** p < 0.01, *** p < 0.001, ^abase: disease costs; ^bbase: Algeria; ^cbase: model studies; ^d positive coefficients denote greater prediction error; ^epositive coefficients denote smaller prediction error