

Table S1. Prevalence and Deaths of NDs at global and regional levels.

	Prevalence						Mortality					
	No., 1990	No., 2019	No. change (%)	Rate 1990 (/10 ⁵)	Rate 2019 (/10 ⁵)	Rate. change (%)	No., 1990	No., 2019	No. change (%)	Rate 1990 (/10 ⁵)	Rate 2019 (/10 ⁵)	Rate. change (%)
Global	1032816852 (1005453170- 1060922862)	1281205444 (1241903619- 1318755122)	24	19305.5 (18794.1- 19830.9)	16558.5 (16050.5- 17043.8)	-14.2	757152 (551921- 1010716)	251577 (221150- 289040)	-66.8	14.2 (10.3- 18.9)	3.3 (2.9- 3.7)	-76.8
Sex												
Female	529685288 (513839845- 545814387)	692220633 (670677683- 714738839)	30.7	19942.2 (19345.7- 20549.5)	17949.5 (17390.9- 18533.4)	-10	389495 (248183- 579814)	137983 (118651- 165844)	-64.6	14.7 (9.3- 21.8)	3.6 (3.1- 4.3)	-75.5
Male	503131564 (489925754- 516254075)	588984811 (570341189- 606915629)	17.1	18677.7 (18187.5- 19164.9)	15176.2 (14695.8- 15638.2)	-18.7	367657 (266013- 450540)	113594 (99257- 129012)	-69.1	13.6 (9.9- 16.7)	2.9 (2.6- 3.3)	-78.7
Age, years												
0-14	427538174 (419116917- 435738380)	435071628 (425910405- 444749386)	1.8	24375.5 (23895.4- 24843)	14099 (13426.8- 14831.1)	-42.2	564529 (416186- 764413)	105914 (83207- 135491)	-81.2	32.2 (23.7- 43.6)	5.4 (4.2- 6.9)	-83.2
15-49	431265277 (411597127- 453090389)	554812466 (528359847- 583619149)	28.6	15901 (15175.8- 16705.7)	22200.6 (21733.1- 22694.4)	39.6	44620 (29767- 64684)	19328 (16765- 22441)	-56.7	1.6 (1.1- 2.4)	0.5 (0.4- 0.6)	-68.8

50-74	153421027 (148981023- 157926412)	248808298 (240218480- 258729588)	62.2	20011.8 (19432.7- 20599.5)	15887.8 (15339.3- 16521.3)	-20.6	77536 (51130- 105916)	42176 (38209- 47596)	-45.6	10.1 (6.7- 13.8)	2.7 (2.4- 3)	-73.3
75+	20592375 (19783221- 21374701)	42513052 (40347642- 44520464)	106.5	17595.3 (16904- 18263.8)	15370.5 (14587.6- 16096.3)	-12.6	70467 (55207- 84779)	84159 (73671- 92196)	19.4	60.2 (47.2- 72.4)	30.4 (26.6- 33.3)	-49.5
Cause												
Dietary iron deficiency	869810011 (852747149- 883933868)	1069047091 (1049331147- 1086685188)	22.9	16258.6 (15939.7- 16522.6)	13816.5 (13561.7- 14044.5)	-15	NA	NA	NA	NA	NA	NA
Iodine deficiency	148778969 (123205368- 181644658)	177359611 (144480601- 219049835)	19.2	2781 (2303- 3395.3)	2292.2 (1867.3- 2831)	-17.6	NA	NA	NA	NA	NA	NA
Other nutritional deficiencies	0 (0-0)	0 (0-0)	NA	0 (0-0)	0 (0-0)	NA	100839 (54507- 151025)	39335 (33756- 45914)	-61	1.9 (1- 2.8)	0.5 (0.4- 0.6)	-73.7
Protein- energy malnutrition	100977331 (92783224- 110877370)	147672758 (130405924- 167471360)	46.2	1887.5 (1734.3- 2072.5)	1908.5 (1685.4- 2164.4)	1.1	656314 (495905- 877702)	212242 (185403- 246217)	-67.7	12.3 (9.3- 16.4)	2.7 (2.4- 3.2)	-78
Vitamin A deficiency	877376295 (840347028- 914976465)	489662709 (469006374- 512234291)	-44.2	16400 (15707.9- 17102.9)	6328.5 (6061.5- 6620.2)	-61.4	NA	NA	NA	NA	NA	NA
SDI												
High- middle	62744119 (60243930-	60343740 (56977085-	-3.8	7633 (7328.8-	5954.7 (5622.5-	-22	8473 (7617-	16051 (13336-	89.4	1 (0.9- 1.1)	1.6 (1.3- 1.7)	60

Central Europe	15133518 (14362917- 15977937)	9911840 (9290904- 10598801)	-34.5	12307 (11680.3- 12993.7)	8677.6 (8134- 9279)	-29.5	202 (190- 213)	426 (371- 481)	110.9	0.2 (0.2- 0.2)	0.4 (0.3- 0.4)	100
Central Latin America	18237115 (17537979- 18947983)	19346252 (18501854- 20300827)	6.1	11111.8 (10685.9- 11545)	7737.9 (7400.1- 8119.7)	-30.4	22759 (21240- 24139)	12093 (10444- 13801)	-46.9	13.9 (12.9- 14.7)	4.8 (4.2- 5.5)	-65.5
Central Sub-Saharan Africa	20172020 (19269418- 21033746)	40123179 (37132932- 43394476)	98.9	36333 (34707.3- 37885.1)	30501.6 (28228.4- 32988.4)	-16	28215 (19392- 40153)	10990 (7837- 15445)	-61	50.8 (34.9- 72.3)	8.4 (6- 11.7)	-83.5
East Asia	168013995 (160600920- 175416190)	123473541 (114254230- 133353129)	-26.5	13713.9 (13108.8- 14318.1)	8387 (7760.8- 9058.1)	-38.8	44286 (38253- 50763)	17431 (15082- 19660)	-60.6	3.6 (3.1- 4.1)	1.2 (1- 1.3)	-66.7
Eastern Europe	23884503 (21996741- 25908025)	18855100 (17090122- 20799959)	-21.1	10544.8 (9711.4- 11438.2)	8979.9 (8139.3- 9906.1)	-14.8	996 (959- 1037)	653 (584- 737)	-34.4	0.4 (0.4- 0.5)	0.3 (0.3- 0.4)	-25
Eastern Sub-Saharan Africa	51593889 (49898881- 53537338)	94368668 (90931864- 98227903)	82.9	27130.9 (26239.6- 28152.9)	22917.4 (22082.8- 23854.6)	-15.5	132221 (102954- 172412)	51564 (42296- 64270)	-61	69.5 (54.1- 90.7)	12.5 (10.3- 15.6)	-82
High-income Asia Pacific	22951715 (21436472- 24494482)	16635730 (15179881- 18234603)	-27.5	13227.9 (12354.6- 14117)	8882.3 (8105- 9736)	-32.9	1056 (979- 1111)	2153 (1757- 2385)	103.9	0.6 (0.6- 0.6)	1.1 (0.9- 1.3)	83.3
High-income North America	13889130 (12698313- 15193146)	18746066 (16814814- 20882181)	35	4944.1 (4520.2- 5408.3)	5142.1 (4612.4- 5728)	4	3012 (2687- 3183)	6445 (5534- 6947)	114	1.1 (1- 1.1)	1.8 (1.5- 1.9)	63.6
North Africa and	57696367 (55547316-	69097781 (66019528-	19.8	16722.2 (16099.4-	11351.4 (10845.7-	-32.1	16668 (11177-	5877 (4773-	-64.7	4.8 (3.2- 8.8)	1 (0.8- 1.2)	-79.2

Middle East	60020550)	72188819)		17395.9)	11859.2)		30267)	7591)					
Oceania	1350778	2620206	94	20878.1	19735.8	-5.5	304 (245-	308 (229-	1.3	4.7 (3.8-	2.3 (1.7-	-51.1	
	(1270132-	(2444892-		(19631.6-	(18415.3-		379)	428)		5.9)	3.2)		
	1425545)	2802661)		22033.8)	21110)								
South Asia	397745965	553740246	39.2	36237	30674.7	-15.3	361126	47208	-86.9	32.9	2.6 (2.1-	-92.1	
	(385000287-	(535214599-		(35075.7-	(29648.5-		(204423-	(37571-		(18.6-	3.3)		
	412552274)	573745017)		37585.9)	31782.9)		528219)	59329)		48.1)			
Southeast Asia	97671041	99256358	1.6	20924	14731.2	-29.6	48594	28551	-41.2	10.4	4.2 (3.8-	-59.6	
	(94111455-	(95060801-		(20161.4-	(14108.5-		(32196-	(25275-		(6.9-	4.7)		
	101191714)	103552176)		21678.2)	15368.8)		62136)	31485)		13.3)			
Southern Latin America	5795717	5459178	-5.8	11698.5	8178.2	-30.1	1595	2040	27.9	3.2 (3-	3.1 (2.7-	-3.1	
	(5346470-	(4870873-		(10791.7-	(7296.8-		(1494-	(1804-		3.4)	3.3)		
	6258982)	6130827)		12633.6)	9184.3)		1701)	2234)					
Southern Sub-Saharan Africa	8352678	10067308	20.5	15912	12812.4	-19.5	8668	5645	-34.9	16.5	7.2 (5.8-	-56.4	
	(7804568-	(9497850-		(14867.8-	(12087.7-		(7070-	(4528-		(13.5-	8.9)		
	8923801)	10694314)		17000)	13610.4)		10576)	6979)		20.1)			
Tropical Latin America	26332602	29126582	10.6	17224.2	13026.5	-24.4	16701	8525	-49	10.9	3.8 (3.4-	-65.1	
	(24014310-	(26388449-		(15707.8-	(11801.9-		(15154-	(7544-		(9.9-	4.1)		
	28544401)	31954189)		18671)	14291.1)		18661)	9192)		12.2)			
Western Europe	26241111	22800592	-13.1	6823.1	5225.8	-23.4	4026	8187	103.4	1 (0.9-	1.9 (1.5-	90	
	(24481303-	(21126960-		(6365.5-	(4842.2-		(3560-	(6588-		1.1)	2.2)		
	28329278)	24680898)		7366.1)	5656.8)		4364)	9419)					
Western Sub-Saharan Africa	49012281	115233699	135.1	25450.3	25253.2	-0.8	54557	38247	-29.9	28.3	8.4 (6.3-	-70.3	
	(47353934-	(110396496-		(24589.2-	(24193.2-		(41847-	(28850-		(21.7-	11)		
	50708688)	119969743)		26331.2)	26291.1)		69618)	50401)		36.2)			

DALYs: Disability-adjusted life-years; SDI: Socio-demographic index.

Table S2. Subgroups AAPCs in prevalence and mortality of NDs.

	Prevalence		Mortality	
	AAPC (95% CI)	p-value	AAPC (95% CI)	p-value
Global	-0.53 (-0.55 to -0.51)	<0.001	-4.97 (-5.75 to -4.19)	<0.001
Sex				
Female	-0.37 (-0.38 to -0.35)	<0.001	-2.93 (-3.15 to -2.71)	<0.001
Male	-0.72 (-0.74 to -0.7)	<0.001	-3.55 (-3.86 to -3.24)	<0.001
Age, years				
0-14	-0.33 (-0.35 to -0.31)	<0.001	-5.77 (-6.12 to -5.43)	<0.001
15-49	-0.42 (-0.45 to -0.4)	<0.001	-4.01 (-5.18 to -2.82)	<0.001
50-74	-0.79 (-0.82 to -0.77)	<0.001	-4.42 (-5.72 to -3.09)	<0.001
75+	-0.46 (-0.49 to -0.43)	<0.001	-2.25 (-3.79 to -0.69)	0.005
Cause				
Protein-energy malnutrition	0.04 (-0.12 to 0.19)	0.63	-5.04 (-5.92 to -4.15)	<0.001
Iodine deficiency	-0.68 (-0.78 to -0.58)	<0.001	NA	NA
Vitamin A deficiency	-3.24 (-3.4 to -3.08)	<0.001	NA	NA
Dietary iron deficiency	-0.56 (-0.58 to -0.53)	<0.001	NA	NA
Other nutritional deficiencies	NA	NA	-4.46 (-4.59 to -4.33)	<0.001
SDI				
High	-0.86 (-0.88 to -0.83)	<0.001	1.48 (1.19 to 1.78)	<0.001
High-middle	-1.04 (-1.09 to -0.98)	<0.001	-1.89 (-2.04 to -1.75)	<0.001
Middle	-0.43 (-0.44 to -0.42)	<0.001	-5.53 (-5.82 to -5.23)	<0.001
Low-middle	-0.69 (-0.7 to -0.69)	<0.001	-7.34 (-8.36 to -6.3)	<0.001
Low	-0.92 (-0.96 to -0.88)	<0.001	-3.58 (-3.72 to -3.44)	<0.001
Region				

Andean Latin America	-1.76 (-1.81 to -1.71)	<0.001	-5.13 (-5.26 to -5)	<0.001
Australasia	-1.08 (-1.12 to -1.05)	<0.001	-1.12 (-1.19 to -1.04)	<0.001
Caribbean	-0.37 (-0.39 to -0.34)	<0.001	-2.97 (-3.08 to -2.86)	<0.001
Central Asia	-0.52 (-0.56 to -0.49)	<0.001	-1.3 (-1.33 to -1.26)	<0.001
Central Europe	-1.2 (-1.24 to -1.17)	<0.001	-1.64 (-1.69 to -1.59)	<0.001
Central Latin America	-1.24 (-1.26 to -1.22)	<0.001	-4.01 (-4.1 to -3.91)	<0.001
Central Sub-Saharan Africa	-0.6 (-0.63 to -0.57)	<0.001	-4.5 (-4.6 to -4.41)	<0.001
East Asia	-1.72 (-1.8 to -1.63)	<0.001	-4.15 (-7.11 to -1.09)	0.008
Eastern Europe	-0.56 (-0.65 to -0.47)	<0.001	-1.03 (-1.12 to -0.94)	<0.001
Eastern Sub-Saharan Africa	-0.59 (-0.61 to -0.56)	<0.001	-4.7 (-5.11 to -4.28)	<0.001
High-income Asia Pacific	-1.37 (-1.4 to -1.35)	<0.001	-2.06 (-2.15 to -1.97)	<0.001
High-income North America	0.11 (0.03 to 0.19)	0.009	0.2 (0.02 to 0.38)	0.029
North Africa and Middle East	-1.33 (-1.37 to -1.29)	<0.001	-3.11 (-3.17 to -3.05)	<0.001
Oceania	-0.2 (-0.21 to -0.18)	<0.001	-1.01 (-1.28 to -0.74)	<0.001
South Asia	-0.57 (-0.58 to -0.57)	<0.001	-4.04 (-4.13 to -3.94)	<0.001
Southeast Asia	-1.21 (-1.25 to -1.17)	<0.001	-3.26 (-3.36 to -3.16)	<0.001
Southern Latin America	-1.23 (-1.26 to -1.2)	0.015	-2.59 (-2.77 to -2.4)	<0.001
Southern Sub-Saharan Africa	-0.74 (-0.8 to -0.69)	<0.001	-2.54 (-2.87 to -2.21)	<0.001
Tropical Latin America	-0.96 (-0.97 to -0.94)	<0.001	-3.66 (-3.76 to -3.56)	<0.001
Western Europe	-0.92 (-0.95 to -0.88)	<0.001	-0.36 (-0.66 to -0.05)	0.022
Western Sub-Saharan Africa	-0.03 (-0.09 to 0.03)	0.31	-2.51 (-2.67 to -2.34)	<0.001

DALYs: Disability-adjusted life-years; AAPC: Average annual percentage change; SDI: Socio-demographic index.

Fig. S1. Prevalence and deaths of NDs in subgroups from 1990 to 2019. (A) Sex subgroup; (B) Age subgroup; (C) Causes subgroup.

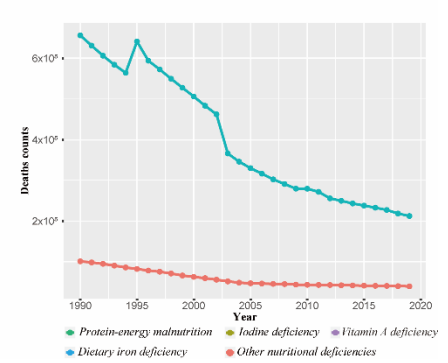
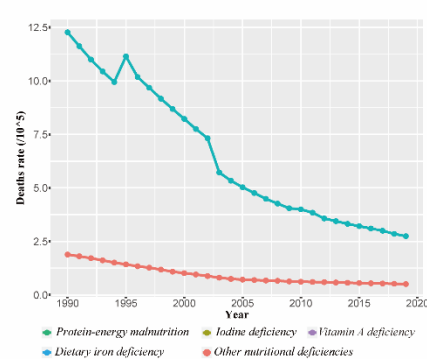
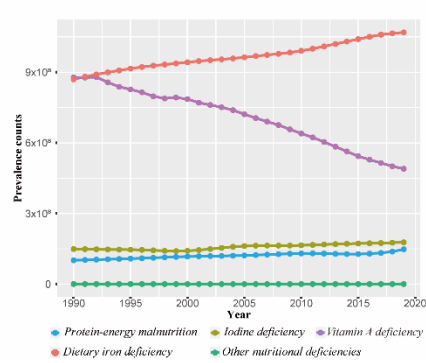
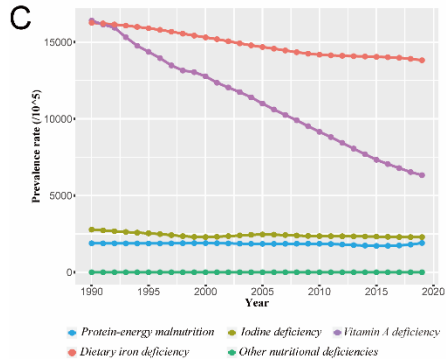
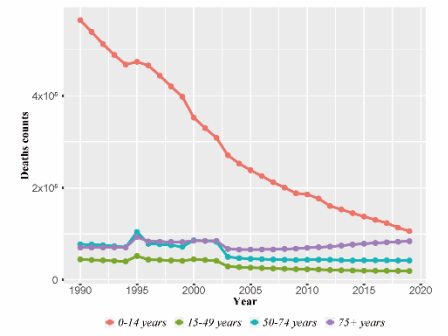
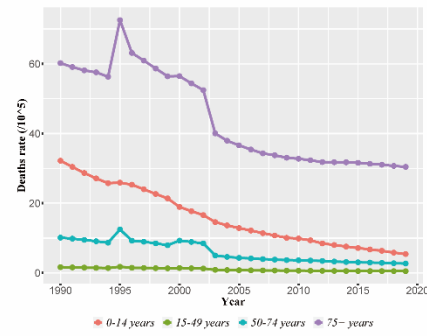
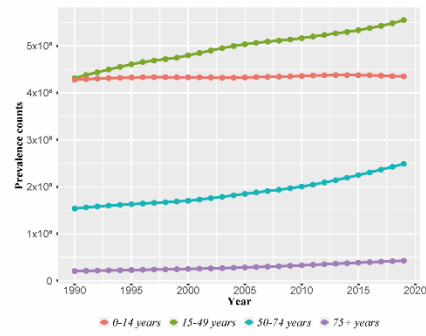
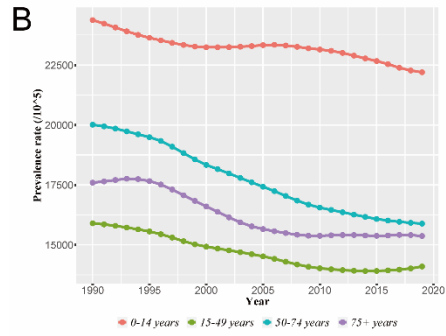
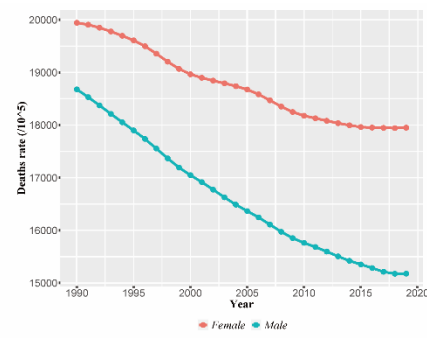
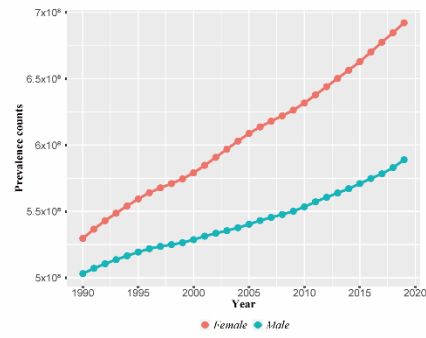
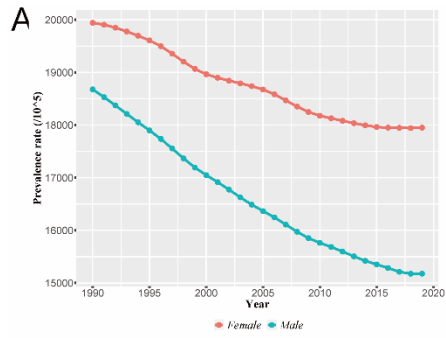
Fig. S2. The number change of NDs between 1990 and 2019. (A) Incidence; (B) DALYs; (C) Prevalence; (D) Deaths.

Fig. S3. The rate change of NDs between 1990 and 2019. (A) Incidence; (B) DALYs; (C) Prevalence; (D) Deaths.

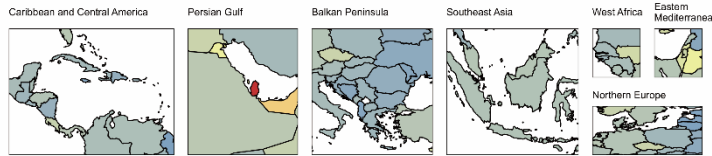
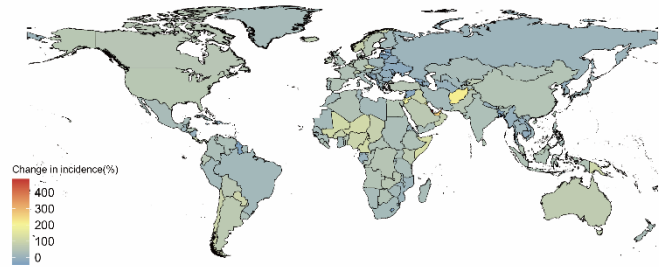
Fig. S4. Geographical distribution of NDs prevalence in 204 countries and territories. (A) Deaths of NDs in 2019; (B) AAPC in deaths rate of NDs between 1990 and 2019.

Fig. S5. Geographical distribution of NDs deaths in 204 countries and territories. (A) Deaths of NDs in 2019; (B) AAPC in deaths rate of NDs between 1990 and 2019.

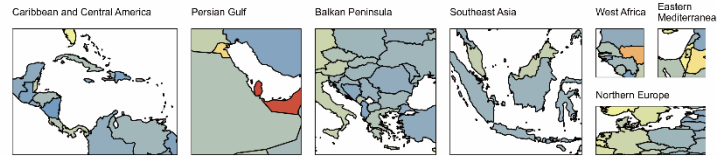
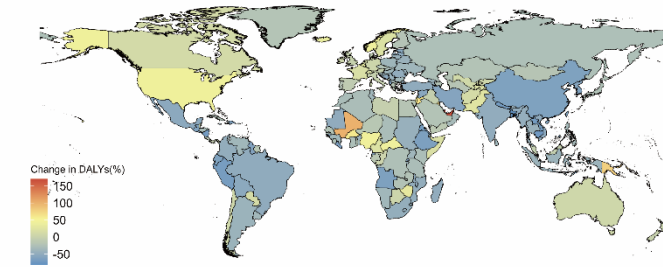
Fig. S6. Global, 21 regions, and 204 countries and territories burden of NDs by SDI, from 1990 to 2019. A Prevalence per 100,000 population in global and 204 countries and territories, B Prevalence per 100,000 population in global and 21 regions, C Deaths per 100,000 population in global and 204 countries and territories, D Deaths per 100,000 population in global and 21 regions. For each region, points from left to right depict estimates from each year from 1990 to 2019.



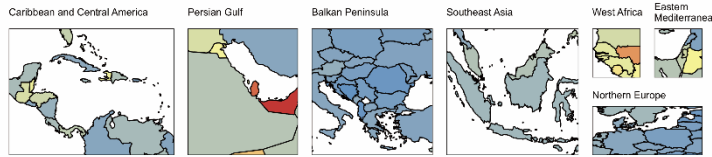
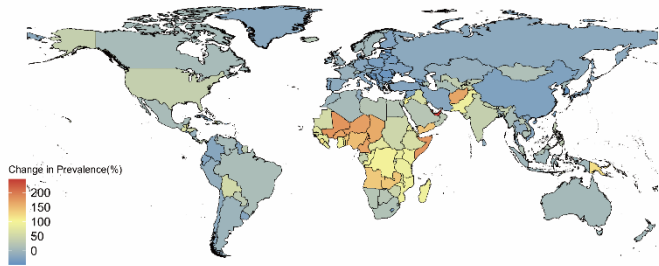
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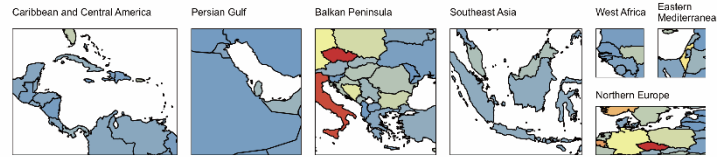
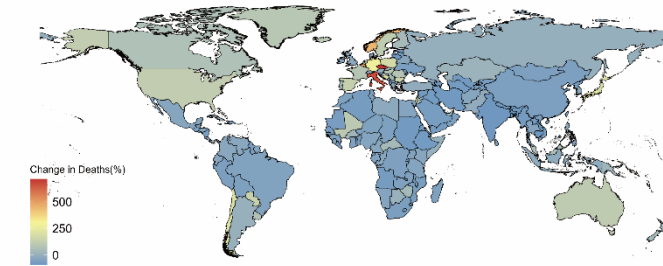
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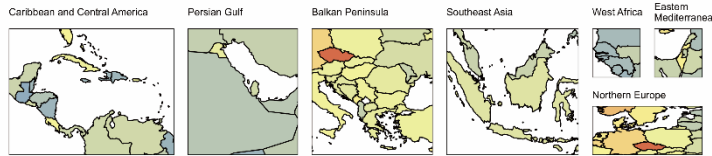
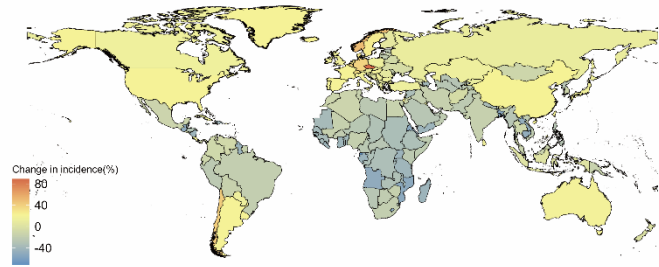
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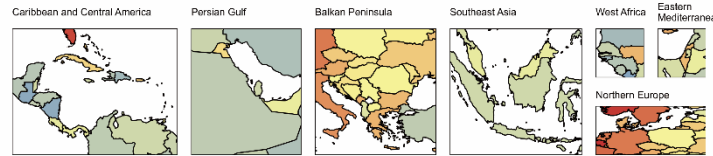
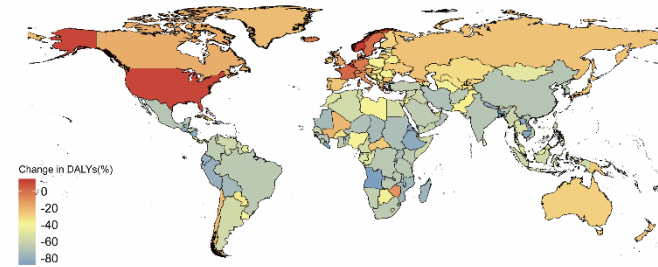
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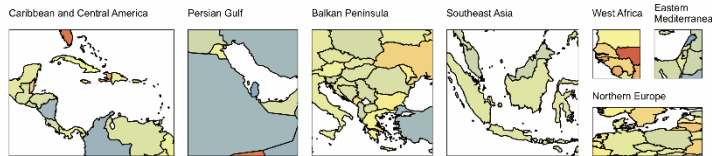
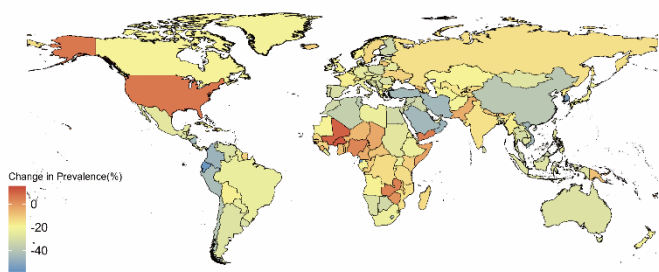
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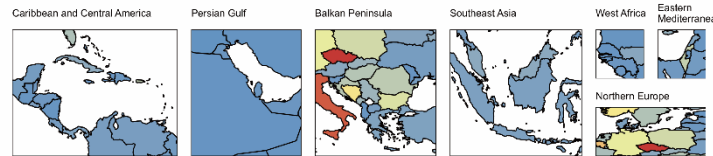
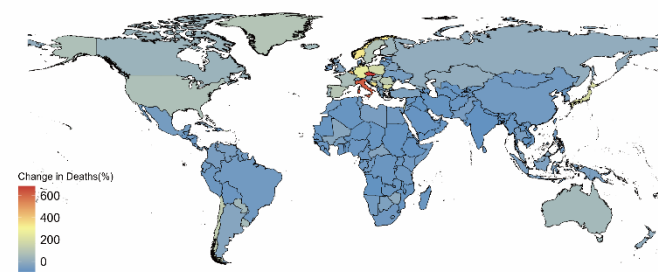
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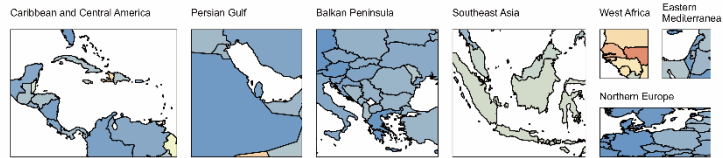
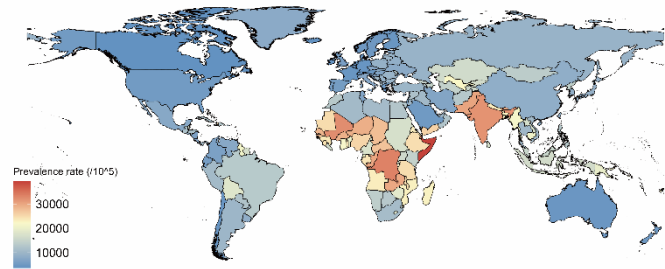
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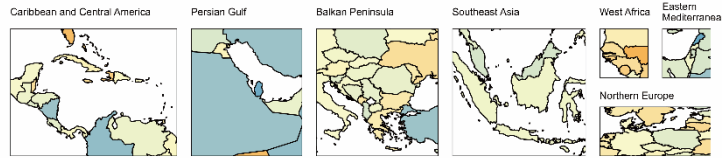
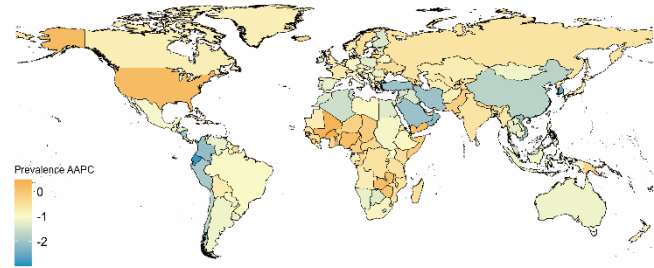
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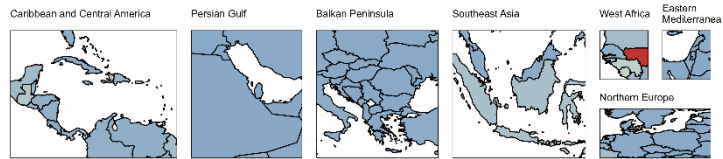
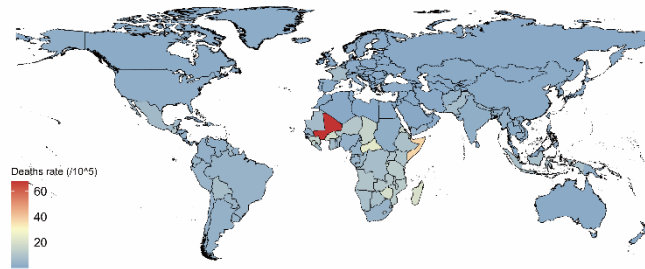
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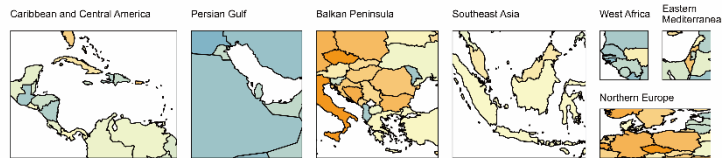
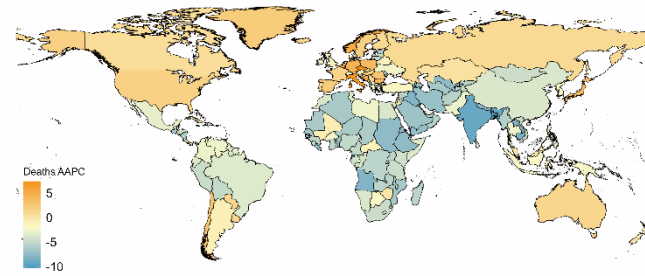
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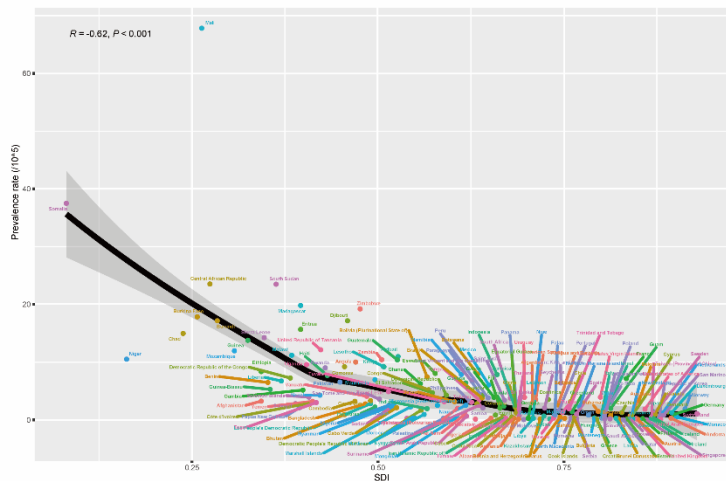
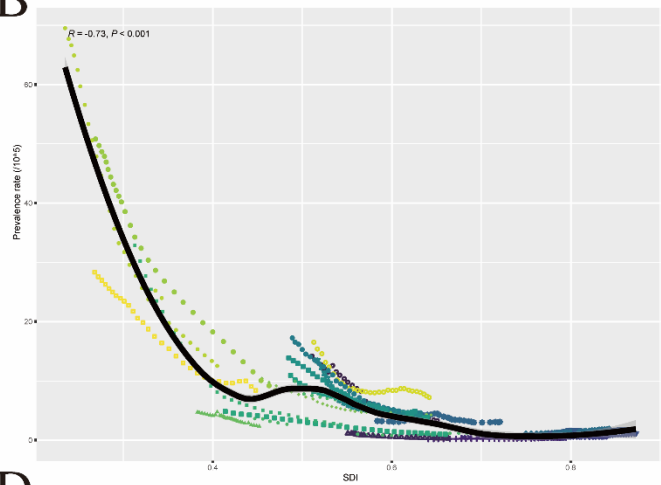
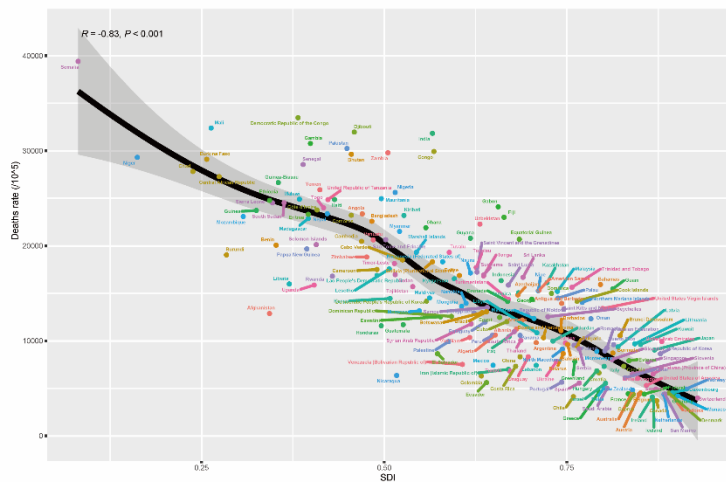


A



B



A**B****C****D**