

# Role of disease-specific and health-sector foreign health aid in noncommunicable disease outcomes: a longitudinal study of 116 low-income and middle-income countries

The NCD Financing Study Group\*

## Background

- Foreign health aid, also known as development assistance for health (DAH), is external funding provided to low-income and middle-income countries (LMICs) by governments and nongovernmental donors in high-income countries with the goal of improving population health.
- DAH can be (a) earmarked for specific diseases (vertical funding) or (b) used for health sector strengthening (horizontal funding).
- The large majority of DAH is disease-specific, primarily allocated to infectious diseases, with small contributions (1-2%) allocated to noncommunicable diseases (NCDs). DAH for health sector support remains comparatively low at around 10-15% of all DAH.
- The relative merits of disease-specific versus health-sector funding have not been empirically established. Theoretical considerations have been used to suggest that shifts in epidemiological patterns from communicable to noncommunicable diseases in developing countries may require a shift from disease-specific to health-sector funding.

## Objectives

- To evaluate the association between select NCD health outcomes and DAH disbursements in LMICs, distinguishing between DAH allocated to NCDs (DAH-NCD) and DAH allocated to overall health sector support (DAH-HS).

## Methodology

- Health outcome indicators for 116 LMICs from 2000-2016 included disease-attributable deaths and disability-adjusted life years (DALYs) for 4 leading NCD categories (cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes), as well as the population rate of elevated blood pressure.
- Health outcomes were evaluated in relation to financing indicators using a country fixed-effects model incorporating multiple-year lagged effects with controls for observed and unobserved fixed and time-variant confounding factors.

Figure 1. Trends in all-cause and NCD-attributed DALYs, 138 LMICs, 2000-2016.

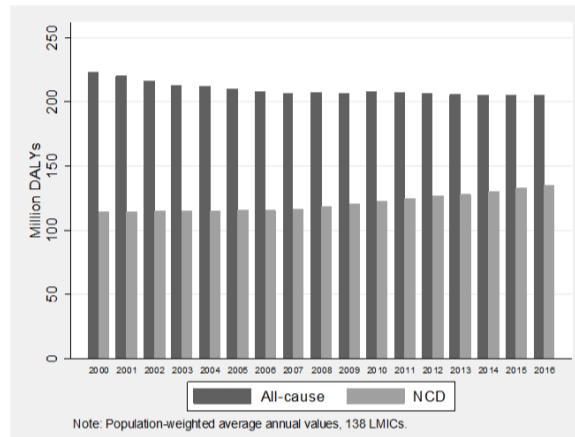


Figure 2. Trends in per-capita DAH disbursements by disease category, 138 LMICs, 2000-2016.

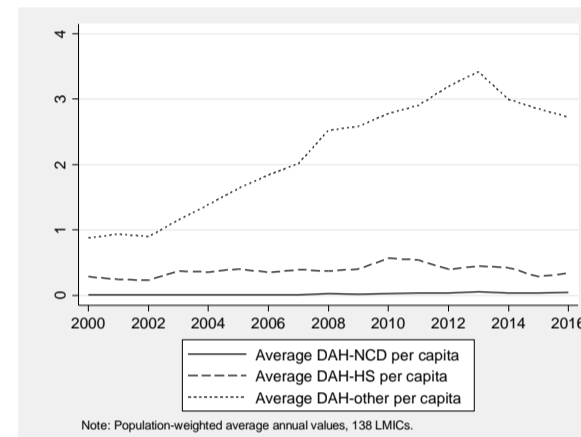
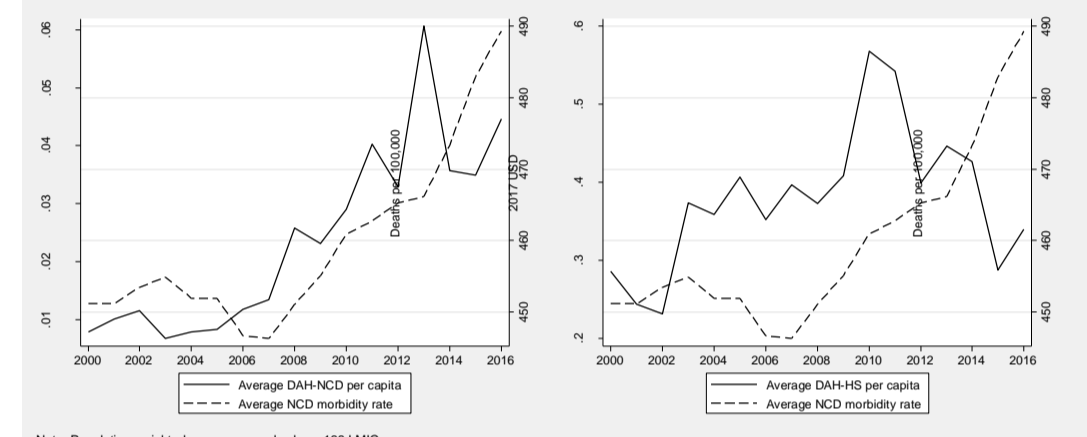


Figure 3. NCD morbidity trends vs trends in DAH-NCD and DAH-HS, 138 LMICs, 2000-2016.



## Findings

DAH-NCD was associated with reductions in NCD-attributed deaths and DALYs for up to 3 years after funding. By contrast, DAH-HS but not DAH-NCD was associated with a reduction in the average rate of elevated blood pressure after a 4-year lag.

Table 1. Summary results†, models of NCD DALYs, 116 LMICs, 2000-2016 (N=1,441). Coefficients represent the average annual change in DALYs associated with a \$1 increase in mean per-capita DAH.

	All-NCD DALYs		Cause-specific NCD DALYs									
	Premature	All-age	CVD		Neoplasms		Chronic respiratory		Diabetes type 1		Diabetes type 2	
			Premature	All-age	Premature	All-age	Premature	All-age	Premature	All-age	Premature	All-age
<b>DAH-NCD</b>												
Lagged 1 year	-6757.2** (2517.9)	-7459.3** (2833.9)	-2207.5* (932.3)	-2264.4* (1083.8)	-1311.6* (617.9)	-1339.0* (603.1)	-1887.7** (716.9)	-2323.7** (871.5)	-54.3 (31.0)	-55.0 (32.8)	-204.1 (244.5)	-245.1 (307.3)
Lagged 2 years	-7136.2* (2910.2)	-7728.3** (2851.7)	-2302.5 (1183.4)	-2256.1 (1154.6)	-1434.4 (724.7)	-1434.1* (650.1)	-2018.8** (750.1)	-2459.7** (880.3)	-61.6* (31.0)	-61.1* (30.8)	-331.7 (320.0)	-402.2 (399.0)
Lagged 3 years	-8229.3* (3568.7)	-8957.7* (3888.1)	-2475.7 (1454.4)	-2486.9 (1652.8)	-1960.4 (1060.4)	-1933.0 (1031.7)	-1953.9** (712.8)	-2433.3** (892.8)	-63.8* (25.4)	-66.7** (25.2)	-244.1 (345.0)	-289.9 (430.7)
Lagged 4 years	-6137.2 (6178.6)	-7256.4 (6743.6)	-2008.6 (2143.3)	-2402.7 (2413.1)	-1510.4 (1810.9)	-1565.3 (1777.5)	-1276.4 (1243.1)	-1675.1 (1553.9)	-49.2 (55.8)	-52.0 (60.1)	-232.5 (364.3)	-286.0 (462.4)
Lagged 5 years	-164.0 (7828.0)	539.7 (8356.7)	-542.2 (2459.4)	-285.0 (2562.2)	159.8 (1720.7)	231.3 (1650.6)	204.4 (2195.9)	426.9 (2715.5)	5.3 (73.6)	20.4 (77.1)	-247.9 (429.5)	-270.7 (542.0)
<b>DAH-HS</b>												
Lagged 1 year	301.4 (613.2)	480.0 (707.6)	45.3 (258.5)	96.8 (301.5)	66.6 (129.3)	79.9 (128.0)	191.5 (153.1)	274.3 (202.4)	2.4 (5.4)	4.0 (6.0)	-16.5 (24.7)	-18.6 (30.7)
Lagged 2 years	356.5 (631.7)	684.5 (734.9)	124.4 (228.2)	276.2 (275.3)	33.3 (138.3)	71.6 (137.4)	156.5 (154.5)	244.0 (204.5)	5.0 (6.2)	6.7 (6.7)	16.7 (33.8)	22.2 (41.2)
Lagged 3 years	1523.9 (942.3)	1863.7 (1143.2)	499.0 (371.2)	622.8 (472.7)	334.7 (225.9)	354.9 (236.7)	397.6 (214.1)	533.0 (279.9)	11.3 (8.6)	13.3 (9.5)	6.5 (55.6)	8.2 (70.0)
Lagged 4 years	1361.6 (791.5)	1647.8 (968.0)	471.4 (339.8)	592.3 (433.1)	280.6 (189.6)	299.3 (196.8)	338.2 (193.2)	441.4 (252.8)	12.3 (7.5)	13.3 (8.6)	21.9 (50.8)	25.2 (63.8)
Lagged 5 years	1415.9 (1336.9)	1674.5 (1586.1)	579.9 (511.2)	706.8 (623.2)	230.4 (263.5)	243.8 (276.0)	351.7 (363.6)	435.9 (467.5)	20.3 (13.9)	20.1 (14.7)	115.0 (92.5)	135.5 (114.4)
<b>DAH-other</b>												
Lagged 1 year	21.5 (433.2)	-25.7 (481.9)	-9.2 (163.9)	-32.7 (182.2)	49.5 (106.3)	49.3 (104.7)	-21.5 (96.4)	-36.6 (123.2)	-2.3 (4.1)	-2.9 (4.5)	-13.0 (24.4)	-16.5 (30.4)
Lagged 2 years	-745.4 (539.7)	-772.1 (603.1)	-234.6 (221.3)	-212.4 (259.8)	-173.2 (134.0)	-156.8 (127.8)	-201.0 (118.9)	-250.1 (152.1)	-5.3 (5.1)	-5.9 (5.6)	-0.8 (28.0)	-0.5 (36.0)
Lagged 3 years	-600.1 (493.8)	-638.9 (581.3)	-207.5 (187.8)	-202.0 (226.5)	-112.9 (97.2)	-101.3 (97.8)	-185.3 (145.3)	-227.3 (185.6)	-7.0 (5.6)	-7.3 (6.2)	-24.9 (32.9)	-29.0 (40.2)
Lagged 4 years	-235.6 (492.3)	-324.4 (578.1)	-93.5 (177.3)	-130.2 (214.2)	-9.3 (112.1)	-16.3 (112.1)	-107.9 (129.7)	-138.1 (169.0)	-5.2 (4.9)	-5.2 (5.3)	-42.5 (31.7)	-50.9 (39.2)
Lagged 5 years	-864.4 (1217.7)	-896.2 (1355.7)	-351.7 (484.6)	-332.3 (547.7)	-201.1 (277.3)	-173.1 (278.8)	-175.8 (253.7)	-223.0 (324.8)	-8.1 (11.1)	-8.0 (11.9)	-91.7 (61.4)	-110.2 (74.4)

Table 2. Summary results†, hypertension rate models, 116 LMICs, 2000-2015 (N=1,379).

	Hypertension rate
<b>DAH-NCD</b>	
Lagged 1 year	0.00292 (0.00205)
Lagged 2 years	0.00268 (0.00216)
Lagged 3 years	-0.00044 (0.00242)
Lagged 4 years	0.00317 (0.00304)
Lagged 5 years	0.00412 (0.00348)
<b>DAH-HS</b>	
Lagged 1 year	-0.00014 (0.00024)
Lagged 2 years	0.00005 (0.00029)
Lagged 3 years	-0.00002 (0.00045)
Lagged 4 years	-0.00076* (0.00037)
Lagged 5 years	-0.00013 (0.00053)
<b>DAH-other</b>	
Lagged 1 year	-0.00008 (0.00022)
Lagged 2 years	0.00004 (0.00022)
Lagged 3 years	0.00048 (0.00031)
Lagged 4 years	-0.00011 (0.00019)
Lagged 5 years	0.00032 (0.00091)

†Notes: Estimates obtained from fixed effects linear models controlling for contemporaneous total DAH, total health expenditure net of DAH, population size, urbanization (urban growth rate), schooling (% enrolled in secondary school), income (per-capita GDP), population weight (average BMI). All models include country fixed effects, year fixed effects, and country-specific time trends, and clustering of the standard errors by country. Standard errors in parentheses. \* Statistically significant at the 5% level, \*\* Statistically significant at the 1% level.

## Conclusion

Funds earmarked for NCD programs in LMICs might play a role in reducing NCD morbidity and mortality volume, most likely through improving opportunities for clinical management. Funds for health sector support might have a limited association with reduced risk factors such as elevated blood pressure.

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