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Research Paper

Research Investments in Global Health: A Systematic Analysis of UK Infectious Disease Research Funding and Global Health Metrics, 1997–2013

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ABSTRACT

Background: Infectious diseases account for a significant global burden of disease and substantial investment in research and development. This paper presents a systematic assessment of research investments awarded to UK institutions and global health metrics assessing disease burden.
Methods: We systematically sourced research funding data awarded from public and philanthropic organisations between 1997 and 2013. We screened awards for relevance to infection and categorised data by type of science, disease area and specific pathogen. Investments were compared with mortality, disability-adjusted life years (DALYs) and years lived with disability (YLD) across three time points.
Findings: Between 1997–2013, there were 7398 awards with a total investment of £3.7 billion. An increase in research funding across 2011–2013 was observed for most disease areas, with notable exceptions being sexually transmitted infections and sepsis research where funding decreased. Most funding remains for pre-clinical research (£2.2 billion, 59.4%). Relative to global mortality, DALYs and YLDs, acute hepatitis C, leishmaniasis and African trypanosomiasis received comparatively high levels of funding. Pneumonia, shigellosis, pertussis, cholera and syphilis were poorly funded across all health metrics. Tuberculosis (TB) consistently attracts relatively less funding than HIV and malaria.
Interpretation: Most infections have received increases in research investment, alongside decreases in global burden of disease in 2013. The UK demonstrates research strengths in some neglected tropical diseases such as African trypanosomiasis and leishmaniasis, but syphilis, cholera, shigellosis and pneumonia remain poorly funded relative to their global burden. Acute hepatitis C appears well funded but the figures do not adequately take into account projected future chronic burdens for this condition. These findings can help to inform global policymakers on resource allocation for research investment.

1. Introduction

Despite major advances in vaccines, diagnostics, therapeutics and infection control measures, the "unfinished agenda" of infectious diseases remains a global threat. The Global Burden of Disease (GBD) Study 2013 reports that lower respiratory tract infections, diarrhoeal disease, HIV, and malaria were four of the top ten causes of disease burden globally, as measured by disability-adjusted life years (DALYs) (Murray et al., 2015). These four disease areas, plus tuberculosis (TB), comprised five of the top eleven causes of death worldwide in 2013 (GBD 2013 Mortality and Causes of Death Collaborators, 2014). Infectious diseases generate a large economic burden (Fonkwo, 2008) with antimicrobial resistance (AMR), the subject of a World Health Organization (WHO) action plan (World Health Organization, 2014) and a priority for the United Kingdom (UK) (Anon.,), European Commission (2011), and the US Centers for Disease Control and Prevention (CDC) (Anon.,), projected to cost an estimated $100 trillion by the year 2050 if unadressed (Anon., 2014).

Research is essential to improve the evidence base for policy and clinical practice. The UK research funding landscape has several national and international awarding bodies that invest in pre-clinical (laboratory) science, observational studies, clinical trials, and translational research, with significant commitments to infectious disease research. Earlier research by the Research Investments in Global Health study

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Table 1
Total funding, number of studies and mean and median award size of research investment by infection 1997–2013. SD, standard deviation. IQR, inter-quartile range.

Disease	Investment 1997–2013					Investment 2011–2013			
	Number of awards	Total investment (£)	Percentage of total	Mean award, (SD)	Median award, (IQR)	Number of awards 2011–2013	Percentage of total	Total funding (£)	Percentage of 2011–2013 total
Overall	7398	3,725,073,507	n/a	503,524 (1,412,776)	192,143 (63,189–418,015)	1232	n/a	916,960,747	n/a
Disease areas and products									
Antimicrobial resistance	413	164,419,467	4.4%	398,110 (901,417)	155,794 (44,065–347,091)	76	6.17%	53,195,899	5.80%
Global health	1712	1,348,277,988	36.2%	787,545 (2,468,415)	253,262 (77,735–589,359)	306	24.84%	343,532,187	37.46%
Gastroenterology	903	355,186,553	9.5%	393,340 (687,605)	218,799 (82,364–394,549)	114	9.25%	90,313,344	9.85%
Healthcare-associated infections	348	105,957,588	2.8%	304,475 (750,448)	71,490 (10,656–252,931)	51	4.14%	43,165,873	4.71%
Hepatology	366	125,058,113	3.4%	341,688 (794,679)	128,340 (43,420–290,954)	44	3.57%	46,794,839	5.10%
HIV	919	651,351,095	17.5%	708,760 (2,350,940)	181,628 (41,468–481,721)	155	12.58%	135,569,246	14.78%
Neglected tropical diseases	490	323,791,367	8.7%	660,798 (2,191,508)	276,730 (107,065–527,303)	83	6.74%	75,444,667	8.23%
Neurology	399	151,371,666	4.1%	379,377 (939,438)	169,212 (70,749–390,007)	60	4.87%	4,226,646	0.46%
Respiratory	1230	556,045,105	14.9%	452,069 (838,744)	207,736 (67,471–445,418)	219	17.78%	145,182,110	15.83%
Sepsis	86	24,762,825	0.7%	287,939 (577,197)	151,855 (54,291–272,451)	7	0.57%	2,210,944	0.24%
Sexually transmitted infections	402	166,144,022	4.5%	413,293 (1,035,635)	112,263 (19,251–269,686)	24	1.95%	17,014,003	1.86%
Diagnostics	484	202,271,238	5.4%	417,915 (1,055,385)	106,001 (19,758–296,732)	77	6.25%	93,692,388	10.22%
Therapeutics	788	662,160,655	17.8%	840,305 (2,683,243)	231,142 (62,947–639,642)	262	21.27%	217,159,123	23.68%
Vaccinology	490	374,959,878	10.1%	765,224 (1,556,168)	266,315 (104,809–730,657)	122	9.90%	119,905,881	13.08%
Specific infection or disease									
African Trypanosomiasis	170	98,621,900	2.6%	580,128 (1,070,225)	288,393 (156,960–505,168)	35	2.84%	29,561,488	3.22%
Aspergillus	32	9,381,561	0.3%	293,173 (680,033)	68,304 (23,920–231,642)	6	0.49%	4,254,846	3.14%
Campylobacter	113	35,796,296	1.0%	316,781 (497,139)	240,419 (95,468–346,045)	26	2.11%	9,775,861	1.07%
Candida	87	31,410,745	0.8%	361,043 (461,554)	282,390 (92,281–416,521)	11	0.89%	6,676,377	0.73%
Chagas disease	18	5,284,555	0.1%	293,586 (222,290)	233,625 (175,747–372,486)	0	0.00%	0	0.00%
Chlamydia	119	25,899,326	0.7%	217,641 (593,623)	60,833 (12,590–196,419)	7	0.57%	2,783,510	0.30%
Cholera	7	1,154,507	0.0%	164,929 (123,277)	89,667 (51,193–287,951)	0	0.00%	0	0.00%
Clostridium	97	56,061,419	1.5%	577,952 (1,089,221)	226,732 (49,926–475,684)	19	1.54%	17,009,293	1.85%
Cytomegalovirus	79	35,695,572	1.0%	451,842 (673,587)	220,703 (118,302–531,000)	11	0.89%	5,287,629	0.58%
Dengue	38	54,430,748	1.5%	1,432,388 (5,674,662)	309,695 (124,361–693,323)	9	0.73%	6,236,268	0.68%
Diphtheria	2	149,094	0.0%	n/a	n/a	0	0.00%	0	0.00%

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