South Africa's Duty to Support Health Research for the Global Poor

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Abstract

This thesis provides the first account of the duties middle-income countries have to the global poor. More specifically, it argues for South Africa's duty to support *health research* for the global poor. In 1999 the South African AIDS Vaccine Initiative (SAAVI) was given the task of developing and testing an affordable, effective and locally relevant HIV vaccine for *southern Africa*. This mandate appears to imply that South Africa has an obligation to support health research for the broader African region i.e. an obligation beyond its borders. South Africa has the means to fulfil, at least part of, this obligation, since it is a hub for both internally and externally sponsored health research. This prompts two questions. First, does South Africa really have an obligation to support health research whose intended beneficiaries lie beyond its borders? After all, South Africa is not a rich country but a middle-income country. Second, if there is an obligation, how far does it extend?

Many theories of global justice accept that very rich countries have some obligation to those who are poor. The global justice literature has, however, been silent on the duties of middle-income countries. South Africa, and countries like it, occupies a unique position that has been neglected in the global justice literature. A middle-income country might have significantly more resources and research capacity than low-income countries, but still struggles to meet internal needs that high-income countries have largely addressed. It is therefore not immediately apparent what the global justice duties of middle-income countries should be. To address this question, I first defend the assumption that, in most cases, prioritising investment in the worst-off[1] is the fairest way to allocate scarce health research resources, since, in most cases, adhering to this principle also serves to maximise total health benefits and increase global health equality. I then argue that when fulfilling duties to the worst-off, neither political boundaries nor national allegiances are morally important, and

[1] The term "worst-off" is sometimes used as an indicator of relative deprivation. In this thesis, my reference to the worst-off is to the global worst-off. Since the global worst-off are absolutely poor, I do not use "worst-off" as a relative term. Those

should not be used to prioritise the needs of some over those of others. This is because the duty to the worst-off is a specific duty of rescue. This rescue duty is so pressing that it trumps justice duties and special duties to co-nationals. Recognizing this rescue duty essentially moves the worst-off outside our political borders inside our scope of moral concern. As a result, South Africa has *equal* duties to the worst-off both within and beyond its borders. Given that a middle-income country, with limited resources, is not able to assist all the worst-off, I suggest a morally defensible way to prioritise within this set. Prioritising the worst-off in sub-Saharan Africa is morally permissible because it will, in most cases, produce a larger overall benefit. South Africa's duties to the worst-off in the region are therefore equal to its duties to its own citizens who are among the worst-off, and can be prioritised over duties to the worst-off elsewhere.

My account offers a morally sound way for South Africa to prioritise limited health research resources while fulfilling its duties to the global poor. Further, to inform how South Africa can begin to fulfil its duties, I identify gaps in global health spending, with a focus on the poor. I outline which populations are likely to be representative of the world's worst-off. I identify what types of health research, in which disease categories, are priorities for these populations, and which of these are the most underfunded. This evidence base informs *how* South Africa can begin to focus its health research activities and resources. I recommend "next steps" for South Africa; offer suggestions for data collection, and insights on the duties of middle-income countries more generally. Finally, since most of the time the fairest way to allocate scarce health research resources, is to prioritise investment in the worst-off, I analyse a selection of the World Health Organisation's global health research priority-setting exercises to establish whether they adhere to this prioritarian principle. I recommend that future global health research priority setting exercises narrow the scope of their recommended health research priorities.

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populations who are worst-off are those whose well-being, as indicated by measures of wealth and/or health, is the lowest of all populations.

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1 Introduction

In 1999 the South African AIDS Vaccine Initiative (SAAVI) was tasked with developing and testing an affordable, effective and locally relevant HIV vaccine for southern Africa (1, 2). This mandate appears to imply that South Africa might have an obligation to take account of the research priorities of the broader southern African community, i.e. an obligation beyond its own borders. South Africa may have the means to fulfil this obligation since it is a hub for health research in the region. This prompts two questions: 1) Does South Africa have this obligation? and 2) If there is an obligation, how far does it extend?

Theorists of global justice have written about what obligations very rich countries have to poor countries. They have not however thought about the obligations of a middle-income country like South Africa to poorer countries. This thesis provides the first account of the obligations middle-income countries have to the global poor. More specifically it explores whether South Africa has a duty to support *health research* for the global poor. The obligation of middle-income countries to the absolutely poor might be different from that of rich-country obligations. Rich countries have the resources to eliminate, or have already eliminated, absolute poverty domestically.[2] They still have resources left over, which could be directed to the absolutely poor beyond their borders, or to the relatively poor domestically. We cannot assume the same for a middle-income country where resources are more limited and where there is often a section of the population that is still living in absolute poverty. South Africa's health research institutions have insufficient

[2] When we say that a group of people are relatively poor, we mean they are poor in relation to the overall distribution of income within a country i.e poor relative to the rest of the country's population. Absolute poverty on the other hand indicates that a group of people fall below some absolute standard of what a person should be able to count on in order to meet their basic needs of health and nutrition. They might not have enough to eat, nor are they enjoying good health. Since large sections of the populations of developing countries survive with the bare minimum or less, reliance on an absolute rather than a relative poverty line is more relevant. This distinction between absolute and relative poverty is consonant with other poverty research and with the measures used by international organizations such as the World Bank. See Deaton (2004). Measuring poverty. Research Program in Development Studies: Princeton University. Available at: www.rrojasdatabank.info/deaton_povertymeasured.pdf; Coudouel, A., Hentschel, J., and Quentin T. Wodon, Q. (2008). p.33 Chapter 1: Poverty measurement and analysis. Available online: siteresources.worldbank.org/INTPRS1/Resources/383606-1205334112622/5467_chap1.pdf

resources to *fully* address the health research needs for their own population in absolute need, neither do they have sufficient resources to completely address the health research needs of the worst-off outside the country. This makes the question of their obligations unique as directing resources to the absolutely poor beyond their borders may mean that some of the absolutely poor domestically are denied.

1.1 The unique position of middle-income countries

South Africa and countries like it occupy a unique position that has been neglected in the global justice literature. This section illustrates that a middle-income country might have significantly more resources and research capacity than its neighbours, but still struggles to meet internal needs that high-income countries have largely addressed. Because of this, it is not immediately apparent whether middle-income countries have any obligations of justice to people beyond their borders.

Figure 1 shows gross domestic product (GDP) per capita for a selected number of countries. The green bars represent three examples of what are usually considered very rich countries (GDP $34100-58600 per capita): Germany, the US and Norway. The red bars represent four examples of what are usually considered very poor countries (GDP $900-1700 per capita): Mozambique, Uganda, Kenya and Lesotho. The blue bars represent some examples of what are generally considered middle-income countries (GDP $3100-10200 per capita): India, China, Thailand, South Africa and Brazil.

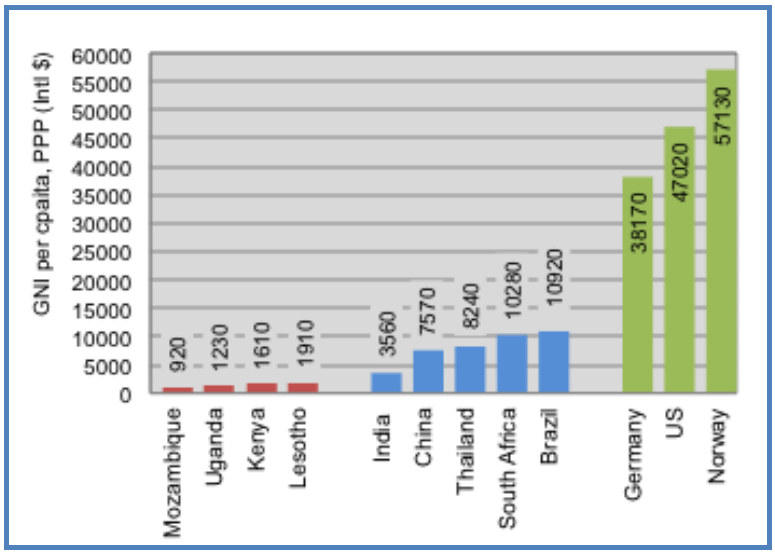

Figure 1.1 Gross National Income (GNI) per capita, PPP (2010)

Source: I sourced data for this graph from: World Bank (2009) Data and statistics: quick reference tables. Available at: http://econ.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20399244~menuPK:1192714~pagePK:64133150~piPK:64133175~theSitePK:239419~isCURL:Y,00.html (Accessed 24 November 2011).

Note: An international dollar has the same purchasing power over GNI as the U.S. dollar has in the United States. See http://web.worldbank.org

South Africa is a middle-income country with a population of 50 million (3). The country has an abundant supply of natural resources and well developed financial, legal, communications and energy sectors. South Africa has its own drug industry with a sound infrastructure and expertise in research and development. The South African pharmaceutical market is the largest market in Africa. The current size of the market is estimated at about US$3 billion (4). South Africa is also known for its innovation in medicine. In 1967 the world's first heart transplant was performed by Dr. Christiaan Barnard at Groote Schuur Hospital in Cape Town. Groote Schuur is the chief academic hospital of the University of Cape Town and is an internationally

acclaimed health research institution. Within the country there are a number of publicly funded health research institutions.[3]

Researchers in South Africa continue to make major scientific contributions in the area of health research. South Africa still dominates sub-Saharan Africa in terms of number of publications, an indicator for research activity (5). This may be because the largest funders of health research are not the government but rather the private sector and foreign funders. For example, less than 5% of South Africa's HIV research funding comes from the government's three major funding sources, the Medical Research Council, The South African AIDS Vaccine Initiative, and the South African HIV/AIDS Research and Innovation Platform (6). Many clinical researchers now draw funding from the drug industry or international donors (5). There are a number of internationally funded health research institutions within South Africa (7), mostly located in universities. South Africa receives the majority of its international funding for health research from the United States (U.S.) and the United Kingdom. From within the U.S., the National Institutes of Health (NIH) is South Africa's largest funder (7, 8). The NIH health research funding received by South Africa far outweighs that of the other top-ten countries to receive NIH funding in sub-Saharan Africa (Figure 1.2). This makes South Africa a hub for health research activity in the region, even if their principle source of funding is not their government.

[3] See for example, Human Sciences Research Council (HSRC) www.hsrc.ac.za/, South African Medical Research Council (MRC) www.mrc.ac.za/, Reproductive Health and HIV Research Unit (RHRU) www.rhru.co.za/

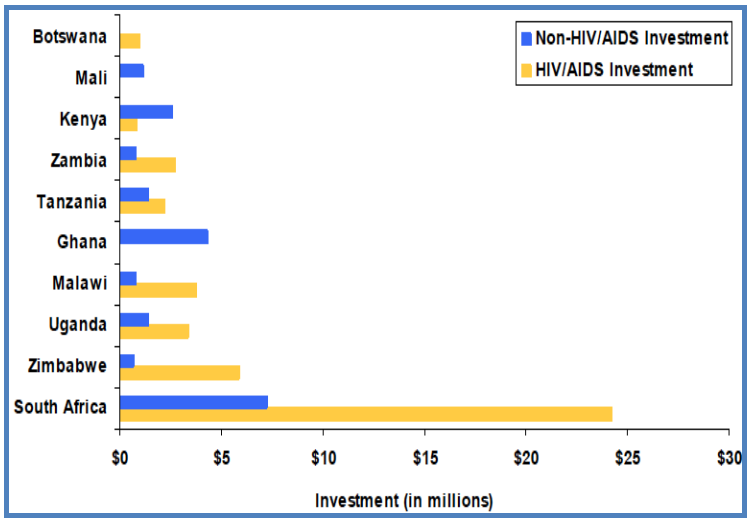

Figure 1.2 Top ten countries in sub-Saharan Africa with NIH funding for health research (average annual investment 2004-5)

Source: The Fogarty International Center (2005). Report on NIH International Extramural Investments in Foreign Institutions FY 2004 – FY 2005 (p.101)

While South Africa is a middle-income country with a well-resourced health research sector relative to poorer countries, it is also a country with extreme differences in incomes and wealth. Although the country is by far the richest in sub-Saharan Africa, millions of its residents remain desperately poor. Daunting social and economic problems remain from the apartheid era. Post apartheid economic growth has enabled a remarkable decline in poverty, but inequality across race, gender and location has still increased. Inequality between racial groups, as measured by the Gini coefficient for example, rose from 0.56 in 1995 to 0.67 in 2009 (9). The gap between rich and poor has essentially widened (10). In 2009, white South Africans were expected to live on average 23 years longer than blacks (11). Close to 60% of poor households in South Africa are in rural areas with compromised access to health care. Income inequality in South Africa continues to be one of the highest in the world (12). The richest 10% of the population accounts for 51% of income while the poorest 10% account for just 0.2% of income, including income from social grants (13).

The country's unemployment rate is 23.6%, if we count only those who are unemployed and actively seeking work, and 37% if we add those who have become discouraged from seeking work. The economic outlook has worsened further after the global financial crisis. In 2009 alone, an estimated half a million workers lost their jobs (13).

Poverty is one of the most significant challenges facing the country with 43% of the population (approximately 20 million people) living on under $2 per day. Poor people have limited access to economic opportunities and basic services. They also bear a greater burden of ill health. The enormous number of people living under $2 per day is a good indicator that a significant proportion of South Africa's population may have limited access to basic health services. Today, Groote Schuur hospital, and others like it, provide highly specialized, hi-tech health services available largely in the private sector.[4] The private health sector however only provides care for around 15% of the population. Eighty five percent of the population depends on the public health sector. In a recent Lancet series on health in South Africa, Kapp reports that 5% of the 8.5% of GDP spent on health is directed towards the health of 7 million people and the remaining 3.5% provides for 41 million (14), echoing the stark inequality within the country.

In South Africa health outcomes are widely disproportionate to overall spending. Despite the fact that South Africa spends more on health than many other African countries (Table 1.1), it is one of only 12 countries worldwide whose under-five mortality rate[5] actually increased since 1990. Under-five mortality increased from 62/1000 live births in 1990 to 77/1000 in 2000 (15). Namibia, Kenya and Uganda spend around half or less per capita on health than South Africa and still have slightly higher life expectancies (Table 1.1). South Africa spends roughly the same per capita

[4] The private sector caters to middle- and high-income earners who tend to be members of medical schemes (approximately 20% of the population), and to foreigners looking for top-quality surgical procedures at relatively affordable prices. The private sector also attracts most of the country's health professionals. See http://www.hasa.co.za/ for a comprehensive listing of the private hospitals in South Africa.

[5] *Under Five Mortality Rate* indicates the annual number of deaths of children under 5 years of age per 1000 live births.

on health as Brazil, but has an under-five mortality rate (U5MR) that is almost three times greater and a life expectancy (LE) that is twenty years shorter (Table 1.1).

Table 1.1 Life expectancy (LE), Under-five mortality rate (U5MR), and Health expenditure per capita, by GNI for selected countries

	GNI per capita PPP, Intl $ (2010)	LE (1990)	LE (2009)	U5MR (1990)	U5MR (2009)	Health expenditure per capita (PPP; Intl $)
Norway	57130	77	81	9	4	5207
USA	47020	75	79	11	8	7164
Germany	38170	75	80	9	4	3922
Brazil	10920	67	73	56	21	875
South Africa	10280	63	54	62	62	843
China	7570	68	74	46	19	265
India	3560	57	65	118	66	122
Thailand	8240	68	70	32	13	328
Botswana	13910	66	61	60	57	1053
Namibia	6580	60	57	73	47	440
Zambia	1370	46	48	179	141	80
Kenya	1610	61	60	99	84	66
Uganda	1230	48	52	184	128	112
Mozambique	920	48	49	232	142	39
Lesotho	1910	60	48	93	84	119

Source: I sourced data for this table from: The Henry J. Kaiser Family Foundation (2010). Health Expenditure Per Capita (PPP; International $) 2008. Available at: http://www.globalhealthfacts.org/data/topic/map.aspx?ind=66 (Accessed 21 November 2011); WHO (2011) World Health Statistics Report. Available at: http://www.who.int/gho/publications/world_health_statistics/en/index.html (Accessed 24 November 2011); and World Bank (2009) Data and statistics: quick reference tables. Available at: http://econ.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20399244~menuPK:1192714~pagePK:64133150~piPK:64133175~theSitePK:239419~isCURL:Y,00.html (Accessed 24 November 2011).

Seventeen years since apartheid, South Africa faces multiple challenges in attaining a higher standard of health and in meeting the Millennium Development Goals (|MDGs). South Africa's sound health policies and programmes in the last 17 years have led to some improvements in health but in some areas progress has been unsatisfactory or even reversed. Life expectancy at birth is now 54 years, a reduction of around 10 years since 1990 (Table 1.1). Among the numerous health challenges faced by the country are the severe HIV and TB epidemics. Eighteen percent of the

population is HIV infected - one of the highest infection rates in the world. This means that 5.5 million people in the country are living with HIV. In 2010, there were close to 400,000 deaths from HIV and nearly one and a half million adults requiring treatment (16).

Successes and failures in South Africa might not be representative of what happens elsewhere in sub-Saharan Africa. However, how South Africa fares *is* important for the rest of the region because of South Africa's increasing influence across the region, and its place (along with China, India and Brazil) as an innovative developing country (17). Also, regardless of the multiple challenges that face the South African health system, community empowerment, non-governmental organisations (NGOs) and a strong civil society play a major role in advocating for people's rights and set an example for other African countries (17). The strong voice of South African civil society has brought about many important changes in health (18). National investment in research amplified by external funding makes South Africa a hub for health research in the region.

While South Africa has significantly more resources and research capacity than its neighbours, it still struggles to meet internal needs that high-income countries have largely addressed. South Africa has a relatively sound infrastructure and expertise in research and development, but has a limited pool of resources for research. Unlike rich countries, South Africa also has a section of its own population that is absolutely poor. South Africa' s research institutions have insufficient resources to *fully* address the research needs for their own population in absolute poverty, and also lack sufficient resources to completely cover the research needs of populations in absolute need outside of the country.[6] It is therefore not immediately apparent what South Africa's obligations of global justice are with regard to prioritising health research.

[6] OECD countries have very few people in them who are absolutely poor, but they still have people dying from diseases. So, it *is* possible to bring someone out of absolute poverty without thereby ensuring that they are free of illness. However, it is *also* possible to alleviate poverty by providing health care, or by conducting research that will lead to better health care for the absolutely poor.

1.2 Thesis structure

In this thesis I explore what obligations a middle-income country such as South Africa has to the global poor, as well as how South Africa can work towards these obligations by supporting health research.

In **chapter two** I explore whether South Africa has duties to the poor only within its borders or whether it also has duties to the poor beyond them. To address this question, I first make the assumption that in most cases investing in the worst-off is the best way to allocate resources in order to treat any set of people fairly. I defend this assumption in chapter four. I then review the three major positions in global justice, cosmopolitanism, statism and nationalism, and set out what I believe would be their positions regarding how the limited resources of a middle-income country should be distributed. I argue that political and national boundaries are not morally important when it comes to addressing the health needs of the *absolutely* poor and should not be used to prioritise the needs of some over those of others. This is because the duty to the absolutely poor is a specific duty of rescue. This rescue duty is so pressing that it trumps duties of justice and special duties to co-nationals. The effect of recognizing this duty of rescue essentially moves people who are outside our political borders inside the scope of our moral concern. South Africa therefore has equal duties to the worst-off both within and beyond its borders. Given that a middle-income country is not able to assist everyone who is among the worst-off, the duties have to be constrained by South Africa's capacity to service the need. We must find a morally defensible way for prioritising the distribution of its limited resources amongst the worst-off. I argue that prioritising the worst-off in sub-Saharan Africa is morally permissible, because it will in most cases produce a larger overall benefit. So although South Africa has equal obligations to all the worst-off both within and beyond its state borders, it is morally permissible to focus its limited resources on the worst-off within sub-Saharan Africa.

In **chapter three** I provide an overview of actual global health research priorities and how spending does or does not correspond. Given South Africa's previously

established duty to the absolutely poor in the African region, the data presented in this chapter points to a number of gaps in global health research spending that could be tackled by South Africa as a means to fulfilling this duty. I frame the presentation of this data with four distinct but related questions: 1) How does global health research spending map onto global health research priorities? 2) How do South Africa's health research priorities compare with Africa's health research priorities? 3) How does global health research spending map onto health research priorities in South Africa compared to how it maps onto health research priorities in Africa? And 4) How does global funding map onto the *types* of health research needed in low-income countries? In each case, the answer to the question shows not just the distribution of spending according to health research priorities, but also points us to how South Africa's duty to the absolutely poor in the African region can be instantiated. Mapping the distribution of funding for health research both by different disease groups and by the type of research funded illustrates to what degree funding is aligned with actual health research priorities. It also shows where there are gaps in funding by disease group and by type of research needed. Identifying gaps in health research spending, and particularly gaps in health research spending for Africa, informs *how* South Africa should fulfil its duty.

In **chapter four** I defend my assumption from the first chapter that in most cases investing in the worst-off is the best way to allocate scarce health research resources in order to treat a set of people fairly. In the first section I outline three of the most commonly used and widely affirmed allocation principles: maximising overall health, increasing health equality, and prioritising the worst-off. I argue that in the case of scarce resource allocation for health *research* globally, prioritizing the worst-off is the best way to treat the global population fairly, since it is also the best way to serve the other two principles. In the second section I outline what populations are likely to be representative of the worst-off globally, as well as what health research in which disease categories are priorities for these populations. I then analyse a selection of the major global health research priority-setting exercises conducted by the WHO over the last two decades. This analysis looks at the major disease areas and types of

research recommended by the WHO to see whether they correctly prioritise the worst-off. Finally, I make some recommendations for how these methods of priority-setting could in the future incorporate the principle of prioritising the worst-off in recommendations for the allocation of scarce health research resources.

In **chapter five** I outline South Africa's special obligations. I review South Africa's current list of health research priorities to see to what degree South Africa is fulfilling its duty according to my account. I make recommendations for which kinds of diseases and which specific types of research South Africa might consider including in an expanded list of health research priorities that address the health research needs of the worst-off across the region. I also offer some insights about the obligations of middle-income countries more generally.

2 Does South Africa have obligations to the poor beyond its borders?

Many theories of global justice accept that very rich countries have some obligation to those who are poor. However, there has been no discussion of what duties middle-income countries such as South Africa have towards the global poor. A middle-income country has limited resources and a section of its own population still living in absolute poverty, and therefore does not have the means to assist everyone in need. In this chapter I explore South Africa's duties to the poor, including those outside its borders. The central question of this thesis is whether South Africa has a duty to support health research for the global poor.[7] I explore the question of how a resource distributor, in this case the South African health ministry,[8] should distribute a limited pool of resources. Later in the thesis I explore how resources for global health research ought to be distributed. I also explore how South Africa should distribute its limited pool of resources for health research. In this chapter I am going to deal only with the question of how to distribute a limited pool of resources, a necessary question to answer before I get to the health research questions. The focal question in this chapter will therefore be: How should a South African ministry distribute a limited pool of resources?

A key part of this question is whether South Africa has duties to the poor only within its borders or whether it also has duties to the poor beyond. To address this question,

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[7] The difficulty here is to show that investments in health research will actually have an impact on welfare. Like Sen and Nussbaum, I believe that health is an important component of overall well-being. Sen and Nussbaum call components of well-being *capabilities*. Following this approach, poor health is understood as a form of capability-deprivation. Those who have poor health could then be described as those who are lacking a certain basic capability, which negatively affects their well-being. Poor health is therefore an indicator of low welfare. Since the very purpose of health research is to develop or adapt interventions that would enhance health and contribute to improved welfare, for the purposes of this thesis, I assume that health research is liable to benefit the well-being of populations. Where there is data that deviates from that model, I will of course take this into consideration. Otherwise this assumption is warranted, since it is plausible that there is feasible health research that will improve the health, and consequently welfare, of a population.

[8] When I refer to how South Africa should distribute its limited pot of resources, I am referring to how a given ministry, in this case the health ministry, ought to distribute its limited pot of resources. Insofar as funds are available, or at the health ministry's disposal, how should they be allocated? This does not refer to the bigger question of how to distribute all the country's resources.

I first make the assumption that in most cases investing in the worst-off[9] is the best way to allocate resources in order to treat any set of people fairly. I then provide an overview of each of the three major positions in global justice theory, cosmopolitanism, statism and nationalism. Each position has different views on what the principles of global distributive justice are. I do not provide a detailed account of every theory, but rather just enough to structure the question of interest. I then set out what I believe would be their positions regarding how the limited resources of a middle-income country should be distributed. The conclusions I draw are relevant for any resource distributor (or government department) tasked with allocating a limited pool of resources.

I argue that when fulfilling duties to the worst-off, political boundaries do not matter. I further argue that national allegiances are not morally important when fulfilling duties to the worst-off. Since both political and national boundaries are not morally important when it comes to addressing the needs of the worst-off, they should not be used to prioritise the needs of some over those of others. This is because the duty to the worst-off is a specific duty of rescue. This rescue duty is so pressing that it trumps justice duties and special duties to co-nationals. Recognizing this rescue duty essentially moves the worst-off outside our political borders inside our scope of moral concern. As a result, South Africa has equal duties to the worst-off both within and beyond its borders. Given that a middle-income country like South Africa with limited resources is not able to assist everyone in absolute poverty, we must find a morally defensible way to prioritise within this set. I argue that prioritising the African region is morally permissible, because it will in most cases produce a larger overall benefit. Although South Africa has equal obligations to all the worst-off, both within and beyond its state borders, this means that it is morally permissible to focus these resources on the worst-off in sub-Saharan Africa.

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[9] The term "worst-off" is sometimes used as an indicator of relative deprivation. In this thesis, my reference to the "worst-off" is to the global worst-off. Since the global worst-off are absolutely poor, I do not use "worst-off" as a relative term. Those populations who are worst-off are those whose well-being, as indicated by measures of wealth and/or health, is the lowest of all global populations. Since large sections of the populations of low-income countries survive with the bare minimum or less, reliance on an absolute rather than a relative measure of poverty is more relevant.

2.1 Distributing limited resources

Theorists writing about global justice have focused on the question of what, if anything, is owed by rich countries to poor countries. But *poor* and *rich* are *relative* terms: one is always poor relative to those who have more, and rich relative to those who have less. In this respect, South Africa is poor relative to "the West" but rich relative to many other African countries. The global justice literature is silent on whether middle-income countries such as South Africa have obligations towards poor populations. In this chapter, I attempt to fill this gap. I explore what duties a middle-income country such as South Africa has to the poor and what the scope of these duties is.

The obligation of middle-income countries to the poor might be different from that of rich-country obligations. Few rich countries have significant numbers of absolute poor within their borders, whereas most middle-income countries have large numbers of absolutely poor people. This makes the question of middle-income country obligations unique. To put this problem starkly, distributing a limited pot of health research resources to the absolutely poor beyond its borders may mean giving less to the absolutely poor within the middle-income country. Given this limited pool of resources, one might ask: "why not simply address the needs of their own absolutely poor first?" The status quo after all, even in rich countries, is to address their own needs first and then see what is left over for others.[10] While this might be true, at least for the most part, in terms of how states currently distribute resources beyond their own borders, it says nothing about what *ought* to be done from the standpoint of justice.

[10] For example, this is a position taken by Richard Miller (2010). Globalizing Justice: The Ethics of Poverty and Power. Oxford: Oxford University Press.

2.1.1 A key distinction: the "global justice question" and the "general allocation question"

When considering questions of distributive justice, actors who are in a position to distribute a limited pool of resources must balance their special and general duties towards those they consider "their own" against any special and general duties they might have to "outsiders." They must also decide how to fulfil these duties in the fairest way. Essentially, two central but distinct questions need to be addressed. The first is the question of "Who counts from the standpoint of justice?" when deciding on allocating a limited pool of resources. I will refer to this as the *global justice question*. The second asks, "How do we treat those who count from the standpoint of justice fairly?" and I will refer to this as the *general allocation question*.

When deciding on how to distribute a limited pool of resources, the answer to the global justice question will determine the set or sets of people who have a *priority* claim on those resources. To determine which set of people count, we must consider the relevance of state borders and other markers that might separate "insiders" from "outsiders," such as national or ethnic identity or religion. In this way, answering the global justice question allows us to articulate duties to fellow citizens, co-nationals, and foreigners. The resource distributor will have similar duties to all of those people who count from the standpoint of justice. They will have a different set of duties to those people who are outsiders.[11]

Once we have answered the global justice question and determined which set of people count from the standpoint of justice, we can then move on to address the general allocation question. The general allocation question asks how we treat those who count *fairly*. Answering the general allocation question helps us determine what it means to treat a set of people fairly. So, given a set of people who all have claims on the distributor of resources, the general allocation question helps us determine how those resources should be distributed. If we have only a limited pool of

[11] For the sake of argument this is a simplification: there could be different groups to which different degrees of priority are owed.

resources, the general allocation question will help us to determine whom it is that gets priority within that set.

In this chapter I will address both these questions. First, I will make an assumption about the general allocation question--i.e., how to treat those who count fairly (section 2.2). Second, I will address the global justice question--i.e., who counts from the standpoint of justice (section 2.3).

2.2 Investing in the worst-off will be the right answer to the general allocation question most of the time

At the heart of all plausible theories of justice is the idea that each person who falls within the scope of justice matters equally. The general allocation question then is not about whether to accept equality but rather about how best to interpret its application. The debate involves which specific kind of equal treatment is normatively required by the more abstract idea of treating people as equals. The best application of this ideal remains contested. For example, John Rawls, in his conception of equal respect for persons, argues for two, lexically ordered, principles. The first principle requires that each person have an equal right to the most extensive system of basic rights and liberties. The second principle has two parts. The first part, fair equality of opportunity, requires that citizens with the same talents and willingness to use them have the same educational and economic opportunities regardless of whether they were born rich or poor. The second part, the difference principle, requires that primary goods are to be distributed equally unless an unequal distribution is to the advantage of the least favoured in society (19). So while justice requires treating people equally in certain respects, this does not entail that they will be equal in all

respects. For example, for Rawls we expect that people will still have unequal amounts of primary goods.[12]

Answering the general allocation question, i.e., deciding how to treat those who count fairly, usually requires balancing three resource allocation principles: the utilitarian principle of maximising total welfare, the egalitarian principle of increasing equality, and the prioritarian principle of investing in the worst-off. For *maximizing total welfare,* the morally right action in resource allocation is that which maximizes the total welfare of a population. For *maximising equality*, the morally right action is that which maximizes equality, either of resources or of some sort of outcome such as welfare. This might imply that one should attempt to distribute resources equally amongst a group of people, or that one should attempt to bring everyone to an equal level of welfare.[13] For *investing in the worst-off*, the morally right action for resource allocation is considered to be that which offers the greatest advantage to the worst-off section of a population.

Each of these three principles may offer guidance on the allocation of limited resources. So, if we had a limited amount of money to invest in the *global* population, what would be the fairest way to spend it? I assume that investing in the worst-off would be a just way of allocating these limited resources *most* of the time. This is because when distributing resources for health, prioritizing the world's worst-off will also tend towards maximizing equality and maximizing the total health benefit. In other words, in *most* cases investing in the worst-off is also the best way to serve both the egalitarian and utilitarian principles. I sketch an argument, with detailed examples, to support this assumption in chapter 4, section 4.1. For the purposes of

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[12] Treating people "as equals" is non-specific in its action-implications. Treating people "as equals" does not necessarily entail treating them equally, in the sense of giving them exactly the same share. For example, a progressive income tax takes more in dollar terms from the rich than the poor, and a welfare state pays more to the poor. But this is still a matter of treating them "as equals" (equal sacrifice, responding equally to people's needs, etc.). Having the same claim to be treated as an equal does not necessarily entail having the same claim to an equal share. You might have the 'same claim' to care and attention from your government, but that can imply treating you differently from someone whose needs and resources differ from your own.

[13] This sense of equality in which the ideal is to distribute a pot of resources equally amongst the members of a group is different from the notion of "treating people as equals" in which the ideal is to distribute a pot of resources amongst the members of a group in a way that we consider to be the most just or fair.

this chapter, I assume this is true for most investments in health *interventions* and for most investments in global health *research*.

There will invariably be a certain number of extreme cases where investing in the worst-off does not fulfil all three principles. One example is that of "resource black holes," a situation in which no matter how many resources are invested into a particularly badly off population, you see little-to-no improvement in health outcomes.[14] In these rare cases one might have to choose and follow one of the other principles, but for the most part investing in the worst-off will typically be the right answer to the general allocation question.

Having made this assumption about the general allocation question, in section 2.3 I move on to address the relevance of borders in decisions of resource allocation, that is, answer the global justice question. I first divide the global poor into four distinct "in-need" populations for analytical reasons (section 2.3.1). I then outline the main positions in global justice (section 2.3.2), and finally I consider how each position would answer the global justice question with respect to South Africa's limited resources, on the assumption I made above that improving the situation of the worst-off is the best way to treat a set of people fairly (section 2.3.3).

2.3 The global justice question: the relevance of borders

2.3.1 Four "in-need" populations

In considerations of global justice, particularly when asking the question of whether the rich have an obligation to the poor, theorists write about resource distributors' duties to different kinds of poor populations. Two key distinctions are often made.

[14] One example of a resource black hole is the Intensive Care Unit (ICU). We often have cases in the ICU where we know the person is probably going to die, but we can sustain their life for a few weeks or months in the ICU, at a tremendous cost, despite the knowledge that we shall probably never raise their welfare to that of the average person.

The first is that of "domestic" versus "foreign" populations, in which duties to a particular group are articulated based on group membership, most commonly membership within a state or a nation. The second is that of the "absolute" versus "relative" poverty of a particular population, in which duties to a particular group are articulated based on exactly how badly off that group is. Combining these two main distinctions, four distinct "in-need" populations can be identified: 1) the relatively poor domestically (RD); 2) the absolutely poor domestically (AD); 3) relatively poor foreigners (RF); and 4) absolutely poor foreigners (AF).

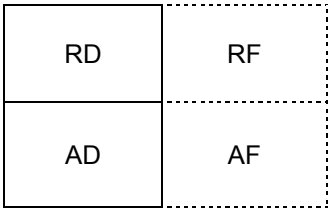

Figure 2.1 Four in-need populations

RD = the relatively poor domestically
RF = relatively poor foreigners
AD = the absolutely poor domestically
AF = absolutely poor foreigners

For the purposes of allocating scarce resources it is often helpful to define different levels of poverty and apply these either within countries or globally. In general, poverty measures are widely used to make funding or resource allocation decisions. National poverty counts are often used for allocating domestic funds. In the United States, particular government benefits are confined to individuals or households that are "poor" as defined by their government. The Indian government subsidizes food provision to state governments according to the fraction of their population that is "poor." Similarly, in South Africa the government funds municipalities according to estimates of the fraction of their population that is "poor."

Levels of poverty are often defined by using poverty lines. Poverty lines are cut-off points separating the poor from the non-poor. While poverty is defined differently according to different governments, the important question is how "poor" *ought to be* defined. For example, at what level of income or welfare should someone be considered "poor" and eligible for certain benefits? Poverty lines can be set in a relative or absolute way. Relative measures of poverty are generally constructed by using poverty lines that move with population averages. So, when we say that a group of people are relatively poor, we mean they are poor in relation to the overall distribution within a country. In each case, "poor" is defined by these governments and is usually based on some relative measure of poverty. Those who are "poor" are only poor relative to the rest of the country's population. Absolute poverty, on the other hand, indicates that a group of people fall below some absolute standard of what a person should be able to count on in order to meet their basic needs. They might not have enough to eat, or might not be enjoying good health. The way in which I have defined the two different types of poverty for the purposes of answering the global justice question, as absolute and relative, is consonant with other poverty research (20) and with the measures used by international organizations such as the World Bank (21, 22). With some idea of the four "in-need" populations to which resource distributors may or may not have duties, in the following sections I address the question of to whom resource distributors have global justice obligations.

2.3.2 Three positions in global justice: varying degrees of international obligation

Political philosophers remain divided on exactly how we should apply the concept of distributive justice beyond the borders of the state. There is little agreement on the question of what the people and governments of wealthier states owe to those outside their borders. Some argue that principles of distributive justice ought to apply in the same way internationally as they do domestically (23-27). Others argue that beyond

state borders there is no justice requirement,[15] that duties of justice beyond state borders are weaker than domestic duties, or that all duties to aid beyond state borders are weaker duties of humanity rather than justice (19, 28-30). In this section, I outline the three main positions in global justice: cosmopolitanism, statism and nationalism.

Cosmopolitanism

Cosmopolitans are broadly in favour of distributive justice being applied internationally with no discrimination between fellow citizens and foreigners. Cosmopolitanism does not recognise any category of people as more or less morally important; nor does it regard states as having a self-contained morality.[16] Rather, cosmopolitans assess actions by their effects on individual human beings. For them, individuals are the basic unit of value. Cosmopolitans argue that there should be global principles of distributive justice. They view justice-based rights and their corresponding duties as human rights, namely rights people hold by virtue of their humanity (24, 31, 32). Duties of justice therefore rest on the value of being human. Rawlsian cosmopolitans argue that duties of justice arise from structures like the state, but that such structures exist internationally (24, 27). Both Charles Beitz and Thomas Pogge take Rawls as their starting point and broadly speaking support a global version of his theory of justice.[17] In general, cosmopolitans would agree that resource distributors have the same obligations to all human beings, independent of where they live. Because borders should not influence justice, states should focus on the worst-off in the world and not merely the worst-off within the state.

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[15] Note that the duties of justice referenced in this chapter refer to *duties of justice requiring the provision of assistance*. This is different from the duty of reparations, which is also a duty of justice. Everyone would recognize 'reparations' as a duty of justice: if you've damaged someone else wrongly, you owe them compensation, whether it is someone inside your state or outside.

[16] Cosmopolitans don't deny that we have special duties toward certain sorts of people (family, people with whom we've signed contracts, etc.). All they deny is that the relationship of 'co-citizenship' gives rise to any special duties.

[17] Yet other cosmopolitans recognise institutions as the most efficient and morally appropriate means of discharging duties to fulfil human rights globally. See Robert E. Goodin, *Protecting the vulnerable: A re-analysis of our social responsibilities*

Cosmopolitans would argue that the same general duties of justice apply to all of the four distinct "in-need" populations identified earlier: 1) the relatively poor domestically (RD); 2) the absolutely poor domestically (AD); 3) relatively poor foreigners (RF); and 4) absolutely poor foreigners (AF).

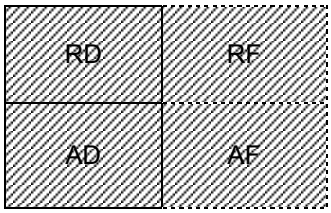

Figure 2.2 The cosmopolitan position on global justice

Populations to which cosmopolitans recognise a duty of justice

Populations to which cosmopolitans do not recognise a duty of justice

Statism

Statists[18] argue that there is something morally important about the existence of a state. They maintain that distributive justice is only properly applied *within* state boundaries. This is because for statists, duties of justice apply to a state's institutions. In their view there are no equivalent international institutions, and no global institutional agent capable of allocating international distributive duties. There is therefore nothing to which the concept of justice can be applied globally. Some statists recognise limited and weaker duties of justice globally (29, 30). However, for

(Chicago: University of Chicago Press, 1985) and Henry Shue, 'Mediating Duties', *Ethics*, 94 (4) (1998), 687-704. For these cosmopolitans, institutions are not a condition for the duty of justice, but simply instrumental for their realisation.

[18] Note that the terms "statism" and "statist" are not established labels. Statists don't call themselves that and "statist" has other meanings. In this thesis the terms "statism" and "statist" are used to refer to the position in global justice that maintains that the requirements of justice apply primarily within state boundaries.

the majority of statists, duties on a global level are largely seen as humanitarian duties to assist the absolutely poor, who face grave risks and have urgent needs.

Statist positions can be differentiated in line with the degree to which they assign priority to the individuals within a state. *Pure statists* would not recognise any duties requiring the provision of assistance outside the borders of the state. This is, however, an extreme position that not many theorists are willing to espouse. Most statists are *strong statists* who argue that duties of *distributive* justice apply only within the state (28, 29), but recognise some duties outside their state borders. Specifically, statists recognise either weaker duties of justice or duties of humanity[19] but not duties of distributive justice. The weaker duties of justice supported by statists aim to assist people in reaching a certain threshold only and are not underpinned by a principle of equality between people worldwide. In *The Law of Peoples,* for example, Rawls claims that inequality in the international setting does not matter in the same way that it does domestically. Rawls acknowledges a duty of assistance to states living under "unfavourable conditions" to establish just institutions, in order to secure basic human rights and meet basic needs. Beyond this minimal duty however, any further address of international inequality is considered unnecessary (29). Thomas Nagel, and Michael Blake, argue similarly that shared citizenship gives rise to a concern with *relative* poverty domestically that is absent in the international setting (28, 30). Likewise, duties of humanitarian assistance abroad are considered weaker than the duties of distributive justice owed to fellow citizens.[20] A wealthy country has only a weaker *duty of assistance* to use its own resources to assist the poor outside its borders.

Essentially, for statists, claims against other states are considered secondary to claims against one's own state. Applying the standard strong statist position to the four

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[19] Duties of humanity are also often referred to as duties of humanitarian assistance, duties of beneficence or duties of charity.

[20] The assumption is that a duty of justice is weightier than a duty of humanitarian assistance. Why, and to what extent, this is the case is however something that statists fail to explain. See Valentini, L (2009). Justice and assistance: Three approaches and a fourth one. Centre for the Study of Social Justice Working Paper Series, SJ009; See also T. D. Campbell, who questions the 'priority of justice' thesis in his 'Humanity before Justice', British Journal of Political Science, 4 (1) (1974), 1-16.

distinct "in-need" populations identified earlier, the statist would recognise a minimal duty of humanity, or a weak duty of justice, to assist the absolutely poor anywhere in the world to meet some baseline of adequacy. So, limited duties of humanity, or weaker duties of justice, would apply internationally but more stringent negative duties of justice would only apply domestically. Statists would agree that there is an obligation to the absolutely poor domestically (AD) and to absolutely poor foreigners (AF) based on duties of humanity in virtue of people's moral status alone. Both these populations have a moral entitlement to a baseline of human decency. Statists would also agree that other more stringent duties of justice apply only to those who are citizens. Concerns about equality rather than merely absolute poverty – and hence with relative deprivation – would be confined to citizens. The duty to the absolutely poor (AD) and relatively poor domestically (RD) is based on the need to justify the state's coercion of citizens, who ultimately have a right to autonomy. This makes the duties to all citizens (AD and RD) more stringent than those to foreigners. Statists would argue that there ought to be no similar concern for relatively poor foreigners (RF) because there is no coercion of the relevant sort on individuals globally.[21]

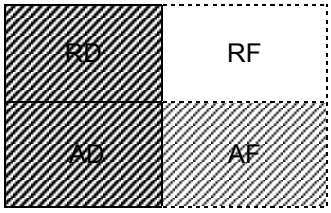

Figure 2.3 The standard statist position on global justice

Populations to which standard statists recognise **more stringent** duties of justice

Populations to which standard statists recognise humanitarian duties or **weaker** duties of justice

Populations to which standard statists **do not** recognise a duty

[21] Blake (2002) and Nagel (2005) claim that there isn't any coercion, of the relevant sort, globally. This is a claim that might be hard to square with the exercise of military might and economic muscle, as Richard Miller argues in his book: Miller, Richard. 2010. Globalizing Justice: The Ethics of Poverty and Power. Oxford: Oxford University Press.

Even for those who are sympathetic to statism, there is reason to believe that this particular statist view, in which duties to the absolutely poor domestically (AD) are more stringent than duties to the absolutely poor elsewhere (AF), is not the right position to take. Michael Blake (30) is the statist that in my opinion has best articulated the justification for statism. Similar to other strong statists, Blake claims that the duties owed to foreigners and the duties owed to fellow citizens are distinct, that shared citizenship gives rise to a concern with relative poverty domestically that is absent in the international setting. Blake, however, stands apart from strong statists in that he recognises general duties of justice (and not merely duties of humanity) to the absolutely poor, both within the state and beyond. For Blake, all human beings, domestic and foreign, have a moral entitlement to exist as autonomous agents. Each individual is entitled to those circumstances and conditions in which they are capable of selecting and pursuing their own plans of life, according to their own ideas of what a good life might be. For Blake, people can only be autonomous agents when the options available to them meet a certain baseline of adequacy.[22]

Blake argues for two principles in line with the protection of autonomy. The first is a positive duty to promote autonomy for those individuals who are not yet autonomous agents. Individuals may be denied autonomy in a number of circumstances of *absolute* deprivation such as famine, extreme poverty and crippling social norms. Absolute deprivation can occur either within the domestic or global context. Blake argues that since the world does have the ability to maintain its inhabitants, and to prevent absolute deprivation, we should therefore accept a positive duty to provide individuals with the baseline of goods and circumstances under which they are able to live as autonomous agents. This positive duty, he argues, should apply globally. Borders are arbitrary when it comes to ensuring the basic autonomy of all human beings. We ought to be concerned with the *absolute* deprivation of foreigners as much as with fellow citizens.

[22] He also believes making more options available to a person beyond this baseline of adequacy does not necessarily increase an individual's autonomy i.e. an individual's autonomy does not depend upon the absolute number of options available to them.

The second principle argued for by Blake is a more stringent negative duty not to impinge on the autonomy of individuals. In general, individuals may have their autonomy limited through forms of coercion. The state coerces citizens through certain coercive political and legal practices. The imposition of this coercive system conflicts with the principle of autonomy. Blake argues that we cannot eliminate the state, given the (paradoxical) importance of government for the protection of citizens' autonomy. Since the state is both coercive of individuals and required for individuals to live autonomous lives, these forms of coercion require moral justification. If the state actively impinges on an individual's autonomy, then it has to be able to justify that impingement of autonomy to each individual person. The state essentially needs to show that the coercion is reasonable for each individual i.e. that these principles can be justified because they are in each individual's best interests. A concern for *relative* deprivation, i.e. what the state could justify to its worst-off citizens, is a way of justifying state coercion.

Blake concedes that coercion occurs at the international level but argues that it does not involve coercive practices against individual human beings. In the international arena, no institution comparable to the state exists. Institutions present at the international level do not engage in the same sort of coercive practices against individuals, no matter how substantive the links of trade, diplomacy or international agreement. Since autonomy of individuals is impinged on to different degrees in these different institutional contexts, Blake argues that there are distinct implications in these distinct institutional contexts. The type of coercion present internationally does not warrant a concern for relative deprivation in the same way that domestic coercion does. Therefore, no obligation to relative deprivation beyond state borders exists.

Applying Blake's position to the four "in-need" populations identified earlier: 1) the relatively poor domestically (RD); 2) the absolutely poor domestically (AD); 3) relatively poor foreigners (RF); and 4) absolutely poor foreigners (AF) gives us an indication of which populations he would recognise a duty to. Blake would recognise positive duties of justice to both the absolutely poor domestically and to absolutely

poor foreigners. He would additionally recognise a more stringent negative duty of justice to citizens, which translates into a duty of justice to those who are relatively poor domestically. Blake does not recognise a duty of justice to relatively poor foreigners. Again, Michael Blake is the statist that, in my opinion, has best articulated the justification for statism. I therefore adopt Blake's position because it is the most plausible version of statism.[23]

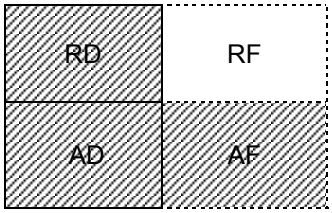

Figure 2.4 Blake's statist position on global justice

Populations to which Blake recognises duties of justice

Populations to which Blake does not recognise a duty of justice

Nationalism

Before giving an overview of nationalist theory, I should make an observation about the term "nationalism." There is an important difference between the *popular nationalism* of political leaders and the *academic nationalism* defended by political

[23] While Blake recognizes *weak, but equal, duties of justice* to the absolutely poor, within *and* beyond the state, most other statists do not. The standard statist view is that there are weaker duties of justice toward anyone outside our own state. Statists also acknowledge duties of *humanity* to aid those in absolute poverty outside their own borders, but generally consider these duties weaker than the duties of justice owed to fellow citizens. A likely objection to Blake's position is therefore that there are stronger duties to DA than to FA and therefore statists are justified in allocating scarce resources to the domestic person in absolute poverty rather than to the foreigner. I think that if this objection is to be supported, it remains to be argued from these opponents either for 1) a better justification for statism that shows one can prefer the domestic absolutely poor; or 2) an interpretation of Blake, contrary to my interpretation, that shows one can prefer the domestic absolutely poor. Given this, I argue for a statist position that looks more similar to Blake's theory. As I will defend further in section 2.4.1, Blake's position is the best able to account for duties of rescue.

theorists. The nationalist position described here does not support popular nationalism, as it is usually understood. Neither does it support the type of nationalism that defines a nation in terms of some arbitrary racial or ethnic group and claims that this nation is much more important than others. Rather, it focuses on some of the more compelling justifications for prioritising people who share a national identity. On most benign nationalist views, co-nationals have special duties to one another, but it is not the case that any particular nation is more important than any other. Analogously, it is generally agreed that family members have special duties to one another, but it is not the case that any particular family is more important than any other.

Nationalists believe that co-membership in a nation is what is morally important. They maintain that the borders of the nation can be different from the borders of the state.[24] A state may include more than one national grouping and people sharing a common national identity may be living in two or more states (33). For example, Quebec is one of many national groupings within Canada, and in 2006 was recognised as a nation in a symbolic motion passed by the Canadian House of Commons. Kurdistan could be considered a nation that spans more than one state. Kurdistan overlaps with four countries: Turkey, Iraq, Iran and Syria. Thus, a nation is a group distinct from the group of co-citizens. Co-nationals are a group of people who share a history of being shaped by, participating in, and sustaining their nation understood as a social group rather than a juridical entity (33, 34).

Nationalists derive special obligations to co-nationals. While duties to non-nationals are not repudiated, the commitment to distributive justice "at home," or what we owe to co-nationals, is viewed as more important than what is owed to non-nationals. Thomas Hurka argues that partiality to co-nationals is justified by special relationships between people. Hurka draws an analogy with the objective features of justified familial partiality, and argues that partiality to one's co-nationals is similarly

[24] Nationalists aim to bring the nation and the state into alignment, but they certainly think that the two can be out of alignment.

justified by both: 1) an accurate and favourable evaluation by co-nationals of their nation's cultural activities; and 2) a shared history of working together to produce benefits (or a shared history of suffering). Co-nationals share a history of being shaped by, participating in and sustaining their nation. Hurka argues that if co-nationals have a shared history of doing good, or suffering from evil, partiality between them is a way of honouring that good.[25] While we should not be as partial to our co-nationals as we are to our families, being partial to some degree is justified.

David Miller argues similarly that partiality to one's co-nationals is justified by special relationships between people. Miller claims that any individual is fundamentally committed to particular persons, groups, practices and institutions. An individual is already deeply embedded in social relationships and is partly defined by these relationships and the commitments, duties and obligations that accompany them. For him a nation is made up of the shared beliefs of a group of people from a history of living together, in which each member recognizes a loyalty to the community, expressed in a willingness to sacrifice personal gain to advance the nation's interests (33, 35). Miller, like Hurka, argues from analogy that loyalty to co-nationals can be defended on the same grounds as other attachments, such as family membership. Miller outlines five elements that distinguish national identity from other identities and that imply that a particular community of people are a nation. For Miller, a nation is a community when it is: 1) constituted by shared belief and mutual commitment; 2) extended in history i.e. its connections have persisted for some significant length of time; 3) active in character; 4) connected to a particular territory; and 5) marked off from other communities by its distinct public culture.

Nationalists believe it is justified that people are partial to, and want to help, their co-nationals above others because they share a history with them and feel connected to them.[26] The four "in-need" populations to be considered by nationalists are then

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[25] Partiality among people who share a history of *doing* evil is for this reason not justified, as it calls for dishonour.
[26] What is important for these accounts is the relatedness of co-nationals. The relational nature of co-nationals denotes that it is an objective moral fact that people stand in specified relationship to each another because of their shared history of working together to produce benefits for their nation. It is important that partiality to co-nationals is based on an objective relatedness and not a subjective one. The relatedness should be one that holds independently of people's subjective attitudes

similar, but distinct, from the four populations considered by statists: 1) the relatively poor within the nation (RN); 2) the absolutely poor within the nation (AN); 3) relatively poor non-nationals (RF); and 4) absolutely poor non-nationals (AF). Nationalists would argue for special duties to co-nationals. This would include special duties to the relatively poor (RN) and absolutely poor (AN) domestically. Nationalists would also recognise more limited, general duties of humanity to absolutely poor foreigners (AF). Figure 2.5 and 2.6 show two interpretations of the nationalist position. The first is an example of the nationalist position illustrated as one nation within a state, for example that of Quebec in Canada. The second is an example of the nationalist position illustrated as one nation that falls across two or more states, for example Kurdistan in Turkey, Iraq, Iran and Syria. The point here is that the nation is another group, distinct from the group of co-citizens.

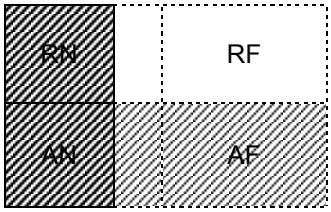

Figure 2.5 The Nationalist position (one nation within a state)

The nation = Populations to which nationalists recognise a special duty

Populations to which nationalists recognise limited, general duties of humanity

Populations to which nationalists do not recognise any duties

to their co-nationals. A purely subjective basis could not rule out racial partiality, which is morally offensive. If we used a subjective relation as the basis of partiality, the fact that racists care more about people with their own skin colour would by itself make it right for them to do so. Also a subjective basis could not justify the duty to favour our co-nationals that would be binding on those who do not care about their co-nationals.

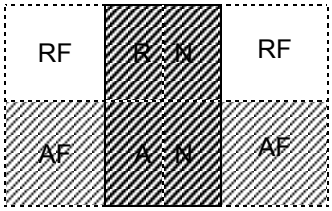

Figure 2.6 The Nationalist position (one nation across two or more states)

The nation = Populations to which nationalists recognise a special duty

Populations to which nationalists recognise limited, general duties of humanity

Populations to which nationalists do not recognise any duties

Key
RN = the relatively poor within the nation
RF = relatively poor foreigners
AN = the absolutely poor within the nation
AF = absolutely poor foreigners

2.3.3 Interim conclusion: varying degrees of international obligation

In the preceding section I gave a brief outline of the main positions in global justice. Although theorists have different views on the scope of the duties of global justice, there is substantial convergence by most on the existence of some duty to aid those in absolute poverty i.e. AN, AD & AF. Disagreement however remains about the extent of obligations internationally to the relatively poor (RF) i.e. those populations beyond the borders of the state who are able to meet their basic needs but who are still poor *relative* to other people in their country or globally. Disagreements also surround the *stringency* of the duty to aid those in absolute poverty abroad, compared to domestically.

2.4 The global justice question with limited resources: prioritising the worst-off

In this section, I consider how each of the three global justice positions would answer the global justice question with respect to distributing resources that are limited, for example the resources that South Africa has allocated to health research. This is an important question to answer because the amount of resources that South Africa currently makes available for health research are insufficient to fully address the health research needs of the poor domestically or internationally. The three positions in global justice described above are usually used to argue for rich-country obligations to the absolute or relatively poor in other countries. With this comes the, mostly accurate, assumption that these rich countries have sufficient resources to address the needs of the absolutely poor within their borders, and would still have resources left over to direct to those in need beyond their borders. When a country does not have enough resources to address the needs of *all* those in absolute poverty, even domestically, the question of obligations to those outside their borders becomes harder still. Resource distributors will have to carefully balance the duties to "their own" against any duties they have to "outsiders."[27] Given the limited resources in a middle-income country, allocating to populations in absolute need beyond their borders might mean that some of their own citizens in absolute need get denied. This prompts the question of how to allocate these limited resources fairly.

2.4.1 Three positions in global justice: prioritising the worst-off

I have up until now addressed the global justice question from each of the three positions, and shown which *set* of people count from their standpoint of justice.

[27] This points to the stringency consideration mentioned briefly above. How stringent are duties toward absolutely poor foreigners (AF) compared to the absolutely poor domestically (AD)? If we adopt the strong statist or nationalist positions, duties to the absolutely poor domestically (AD) are more stringent than duties to absolutely poor foreigners (AF). The domestic person who is less deeply in absolute poverty would have a stronger claim on us than the foreign person who is more deeply in it. If we adopt the cosmopolitan position and/or my interpretation of the statist position, these duties are equally stringent. Anyone equally deeply in absolute poverty worldwide has the same claim on us.

Cosmopolitans argue that equal duties of justice apply both within and beyond the borders of the state, to the absolutely and the relatively poor. Blake's statist position also recognises equal duties of justice to the absolutely poor both within and beyond the borders of the state.[28] Concerns about relative poverty and the corresponding duties of justice are however confined to citizens and statists do not recognise similar duties to relatively poor foreigners. Nationalists recognise special duties to co-nationals that are more stringent than the duties to non-nationals. Having established the scope of global justice duties according to each of the three positions – i.e. the set of people who count – I will next apply the general allocation principle which establishes how to treat this set of people fairly. Working within the assumption that investing in the worst-off is the fairest allocation principle, I apply this assumption to each of the three global justice positions. In so doing, resource distributors will be able to fairly delineate who it is that should be prioritised within the set of people who count.

Cosmopolitanism

The cosmopolitan position recognises that resource distributors have an equal duty to all of the four "in-need" populations: 1) the relatively poor domestically (RD); 2) the absolutely poor domestically (AD); 3) relatively poor foreigners (RF); and 4) absolutely poor foreigners (AF). These four populations represent the entire set of people who count for cosmopolitans. If we have limited resources and we invest these in the worst-off as a way of treating this entire set of people fairly, then the populations prioritised within this set would be the absolutely poor, domestically

[28] Some statists argue that duties to absolutely poor foreigners are less stringent duties of humanity. My interpretation of statism rests on Blake's interpretation of duties of justice to the absolutely poor, independent of location.

(AD) and abroad (AF). Cosmopolitans might prioritise these populations by *giving more* to people in these populations.[29]

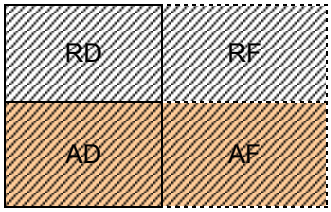

Figure 2.7 The cosmopolitan position with limited resources - prioritising the worst-off

Global justice question: populations to which cosmopolitans recognise equal duties
i.e. the set of people who count

General allocation question: investing in the worst-off
i.e. who it is that gets priority within that set

Statism

Blake's position on the global justice question recognises that resource distributors have equal duties of justice to the absolutely poor, both within and outside of the state. Additionally, Blake recognises a duty of justice to those who are relatively poor domestically and no justice duty to relatively poor foreigners. If these three populations (the relatively poor and absolutely poor domestically, and absolutely poor foreigners) represent the set of people who count, the next question is how we prioritise within that set if we have limited resources. Assuming we invest in the worst-off as a way of treating this set of people fairly, statists would then prioritise those who are absolutely poor. Since Blake's more moderate statist position would

[29] Here I assume that cosmopolitans would prioritise the absolutely poor by giving *more* to people in those situations, while still giving something to the relatively poor. It does not have to be "all-or-nothing". Of course they might give something to

recognise *equal* claims by the absolutely poor domestically *and* abroad, the resource distributor would have the same general justice duties to both of these populations. Applied to the four in-need populations, a moderate statist would support my analysis and recognise equal duties of justice to those who are absolutely poor both within and outside of the state.

A strong statist would not endorse my view and might prioritise citizens over foreigners regardless. The strong statist position on the global justice question holds that resource distributors have more stringent duties of justice to the relatively poor domestically (RD) and to the absolutely poor domestically (AD). Some would recognise weaker duties of justice, and some weaker duties of humanity, to absolutely poor foreigners (AF). In consequence of that, strong statists would prioritise the absolutely poor domestically over absolutely poor foreigners.[30] I now argue however that, even if one is a strong statist, there is reason to accept that when it comes to distributing limited resources to the absolutely poor, duties to foreigners are not necessarily weaker than duties domestically.

Rescue duties trump justice duties

Currently when theorists draw a distinction between duties of justice and duties of humanity, they think that duties of humanity are weaker. The basic assumption is that a duty of justice as a general rule trumps a duty of humanity. However, when we talk about the *absolutely* poor, it could be argued that this more general duty of humanity becomes the very specific duty to rescue. Those living in absolute poverty fall below some absolute standard of what a person should be able to count on in order to meet their basic needs. When it does not cause death, it still causes misery of a kind not

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the relatively poor, or nothing.

[30] Strong statists might also argue that since humanitarian duties of assistance are weaker than special duties of justice owed to fellow countrymen, the relatively poor domestically should also be prioritized over humanitarian duties to absolutely poor foreigners.

often seen in rich nations. If this duty of humanity is in fact a duty to rescue those in absolute poverty, either to prevent death or merely allow the basic fulfilment of needs, then it is *not* clear that this duty of humanity is trumped by the duty of justice. In fact, the specific duty to rescue trumps duties of justice even if other more general duties of humanity do not.

This is best illustrated through a simple example. Let us imagine that there is a South African lifesaver, alone on the beach, watching over two people swimming in the waves. He suddenly notices that both swimmers have been swept out by the current and need to be rescued. Without his intervention, they will certainly drown. He knows he can only save one of these people, the current is strong and he does not have enough time to get to both. One of these swimmers is South African, the other Zimbabwean, and the lifesaver knows this. Would it be fair for the lifeguard to choose which person to save based on citizenship? Surely not. In fact the duty of justice seems to be irrelevant in the case of rescue. Duties of justice are concerned with inequality i.e. the level of one person's well-being relative to another's. The fulfilment of justice duties is aimed at reducing this inequality. Duties of justice however tell us nothing about what we ought to do when choosing between people in need of rescue.[31] This is because the duty to rescue is not concerned with how to reduce inequality but rather with the saving of lives. The fairest way to interpret the duty of rescue is that we owe each person an *equal* chance of being rescued *based on need.* In the case of the lifesaver, the need of the drowning South African is equal to that of the drowning Zimbabwean. To be fair, the lifesaver would therefore owe each of these drowning individuals an equal chance of being rescued. This duty of rescue is pressing enough that the claim for a chance of rescue trumps the duty of justice. The lifesaver would therefore not be allowed to choose to rescue the South African over the Zimbabwean, based merely on the existence of a shared state.

[31] If a statist believes that a particular resource distributor gets to prefer citizens in a rescue scenario, the onus rests on them to provide a compelling argument for this.

Analogously, in the case when there are many more people, or populations, who need rescue than can be rescued with our limited resources, we owe each person, or population, an equal chance of being rescued *based on need.* If all the populations in need of rescue are absolutely poor then their need is equally dire. The duty to rescue would again not be a means to decreasing inequality but rather an attempt to lift these populations above a reasonable definition of human decency, or at the least to save lives. Again, this duty of rescue is pressing enough that the claim for a chance of rescue trumps the duty of justice. The resource distributor would therefore not be allowed to choose to rescue the absolutely poor domestically (AD) over absolutely poor foreigners (AF). If political boundaries do not matter when it comes to the duty to rescue, then choosing amongst the world's absolutely poor cannot be based on shared citizenship. So even if you are a strong statist, there is no reason to believe that the duty of justice trumps this rescue duty. One might *not* want to think of the duties to foreigners who are absolutely poor (AF) as weaker than duties to the absolutely poor domestically (AD).

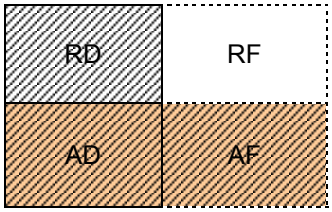


Figure 2.8 The statist position with limited resources - prioritising the worst-off

Global justice question: Populations to which statists recognise a duty
i.e. the set of people who count

General allocation question: Investing in the worst-off - equal claims by AD and AF
i.e. who it is that gets priority within that set

Nationalism

The nationalist position argues that resource distributors may give priority to co-nationals. This translates into a special duty to two groups: 1) the relatively poor within the nation (RN); and 2) the absolutely poor within the nation (AN). Nationalists may also recognize other duties on different grounds than that of the duties to co-nationals, such as duties of justice and a general duty of humanity to the foreign poor. As with statists, nationalists would consider the stringency of these duties less than that of the special duty to co-nationals. Given the special case of a middle-income country in which there are not enough resources to address the needs of any one of these groups, nationalists would need to ask how we could further prioritise within this set of people who count for them. Assuming we invest in the worst-off as a way of treating this set of people fairly, the population that would be prioritised by the nationalist would be the absolutely poor within the nation (AN). Most nationalists maintain that the nation is smaller than, or roughly the same size as, the state. This would roughly translate into giving priority to the claims of South African citizens who are absolutely poor over the claims of the absolutely poor elsewhere. I argue however that, even if one is a nationalist, there is reason to accept that when it comes to distributing limited resources to the absolutely poor, duties to foreigners are not necessarily weaker than duties domestically.

Earlier I argued that a person's stronger claim to rescue could not be legitimately defended by his or her shared citizenship with the resource distributor. In the case that there are more people in need of rescue than can be rescued, the resource distributor owes each person an equal chance of being rescued based on need. The duty of rescue is pressing enough that the equal claim for a chance of rescue trumps any duties of justice. If we accept that the existence of a shared state is not a legitimate reason to favour the absolutely poor domestically (AD) over the absolutely poor elsewhere (AF) in a rescue scenario, then it is also likely that a similar objection could be levelled against allegiances as a legitimate reason to favour some over others in a rescue scenario. If the duty of rescue is pressing enough that the equal

claim for a chance of rescue trumps the duty of justice, then it could also be true that the duty of rescue is pressing enough to trump priority being given to co-nationals. When we are talking about duties to those who are in absolute poverty, the specific duty of humanity, the duty to rescue, trumps any special duties of co-nationality.

A committed nationalist might argue that South African national identity *is* permissible grounds for a South African resource distributor to prioritise absolutely poor South Africans over the absolutely poor elsewhere. Even if there is this equal duty to rescue when it comes to the absolutely poor, in the case that there are more people amongst the absolutely poor in need of rescue that can be rescued, the relationship between South African co-nationals would be a legitimate reason to save them first. Returning to the lifesaving example, this nationalist might ask us to imagine that of the two people in need of rescue, one is the lifesaver's mother, and the other a stranger. Just like partiality to saving his mother is justified by his special relationship with her, so would partiality to his co-nationals be justified by his special relationship with them.

In the following section I argue that there is still reason to believe that this committed nationalist's account does not support special duties to South African nationals. I argue that even if the committed nationalist believes we are morally permitted to prioritise our co-nationals, this does not neatly translate into special duties to fellow citizens. This is because the nation does not always correspond with political borders. Co-nationals are not always co-citizens. In the case of South Africa, I argue that there are scarcely stronger national ties than regional ties. Since this is true, it is not defensible for nationalists to draw on a principle that results in "South African nationalism" when this same principle could equally result in "pan-African regionalism".

Who are co-nationals?

Even for the nationalist who argues that South African national identity *is* permissible grounds for a resource distributor to prioritise co-nationals in a rescue scenario, this does not neatly translate into special duties to fellow South African citizens. This is because the nation does not always correspond with political borders and therefore "co-nationals" are not always co-citizens. So who are co-nationals? Co-nationals are a group of people who share a history of being shaped by, participating in and sustaining their nation (34). Most nationalists maintain that the nation is restricted to a local community, either smaller than or roughly the same size as the state (33-35). If we were to accept this traditional interpretation of nationalism, then it seems to follow that it is permissible for a South African resource distributor to prioritise the needs of its fellow citizens above the needs of people beyond its own political borders. But this result only follows from a mistaken interpretation of nationalism, which assumes that we only have this shared history with citizens of our country or members of smaller communities. There is no reason to think that we do not also share this "nationhood" with members of groups much larger than those occupying states.

The distinctive features of relatedness that constitute a nation, as drawn from the salient features of Hurka's and Miller's nationalist accounts, include: 1) an accurate and favourable evaluation of certain general qualities of the nation, or minimally a recognition of their distinct public culture; 2) a shared history of working together to produce benefits (or shared history of suffering); 3) being connected to a particular territory or geographical place; and 4) shared belief and mutual commitment. These same features could be shared by a group larger than the state. At least in some cases in which nationalists believe nationality is a relevant feature, the attributes that justify partiality to co-nationals are attributes that are also shared between (groups of) people that reside both inside *and* outside a country's borders. If members of a group larger than a state share these attributes, then surely partiality among members of this larger group is also justified.

Consider the region of Sub-Saharan Africa. Individuals within the region conceive of themselves as "African" and have a favourable evaluation of what it means to be part of this African culture. The region is marked off from other communities by its distinct African culture. Individuals have shared a history of suffering historically, under colonial powers, as well as under apartheid, for though apartheid was confined to the borders of South Africa, its impact was felt across the entire Sub-Saharan region. The apartheid state did not just destabilise South Africa's neighbours, but also the other countries of Southern Africa, which have a common history and geography and, thus, a common future (36). Individuals within the region have additionally shared a history of working together for mutual benefits. One important example is that of the abolition of apartheid. Many Southern African Development Community (SADC)[32] members allowed the exiled African National Congress (ANC) and Pan Africanist Congress (PAC) to establish bases in their countries. Individuals within these countries assisted with the protection of important political figureheads and freedom fighters that lead to the abolition of South Africa's apartheid.

The people of Southern Africa are connected to a particular territory or what Miller refers to as a "homeland" which connects this group of people to a geographical place. An essential part of a national identity is that a people should permanently occupy that place. Miller argues that the actions nations aspire to perform must include that of controlling a chunk of the earth's surface, to create a "political community," something which the region of Southern Africa has both aspired to and achieved in its creation of and sustained membership in SADC. The region is also constituted by shared belief and mutual commitment. Members recognise one another as compatriots or fellow Africans. When we consider the very similar regional distribution of disease burden, for example malaria, HIV and AIDS, and tuberculosis (TB), people within the region are certainly mutually committed to addressing these

[32] SADC's vision is that of a common future, a future within a regional community that will ensure economic well-being, improvement of the standards of living and quality of life, freedom and social justice and peace and security for the people of Southern Africa. This shared vision is anchored on the common values and principles and the historical and cultural affinities that exist between the people of Southern Africa. See http://www.sadc.int/english/about-sadc/

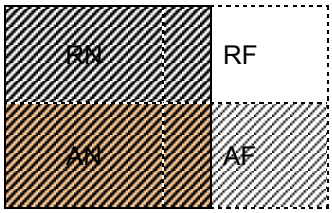
common challenges.[33] Having to work together as a region creates a sense of belonging or solidarity--"one voice" for the people of the region, who all suffer under the same burden. Being co-contributors toward the advancement of a common goal creates a sense of unity.

So, does this region share the features of a "nation"? The region does have a distinct public culture; a shared history of working together to produce benefits (and a shared history of suffering); being connected to a particular territory or geographical place; and shared belief and mutual commitment. Based on this, the region of Southern Africa effectively meets the criteria for a "nation" whose members may show partiality to each other.[34] Applying the principles underlying nationalist theory would generate special obligations, not just to co-nationals as they are traditionally conceived of, but also to co-regionals.[35] The effect of recognizing these regionalist duties essentially moves people who are outside our political borders inside our scope of moral concern. On this regionalist account of global justice, one would recognize special duties to the absolutely poor within the region, rather than just duties to South African citizens who are absolutely poor. This "regionalist" position might look something like Figure 2.9.

[33] One example of such a mutual commitment is that of the *Southern Africa Roll Back Malaria Network (SARN)*. Established and launched by SADC in 2007, SARN is a partnership of government, private sector, NGOs, UN Agencies and Communities. It coordinates partner support on technical and operational issues for going to scale with effective malaria control interventions to 10 Southern African countries: Botswana, Madagascar, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, Zimbabwe and United Republic of Tanzania (Zanzibar) and also supports Angola, DRC and United Republic of Tanzania by bringing program managers, NPOs and military managers to the annual consultative meetings and through cross border collaboration initiatives, SADC Malaria Day and World Malaria Day. See http://www.sadc.int/english/regional-integration/shdsp/sarn/

[34] See Miller (1995) p. 18 where he clarifies that there can legitimately be disagreement about whether a particular group of people, say the Scots or the Quebecois, form a nation or not, beyond the admitted vagueness or complexity of the criteria for being a nation. It is a matter of interpreting what people believe about themselves – and this is further complicated by the fact that the attitudes and beliefs that constitute nationality are very often hidden away in the deeper recesses of the mind, brought to full consciousness only by some dramatic event. So simple empiricism will not settle the issue, even if it is a direct survey of people's beliefs about nationhood.

[35] If we see 'association' as the more generic term, then 'regionalism' is another form of 'associationalism', alongside 'nationalism' -- grounded on the same fundamental associational logic.



(Where the "nation" is larger than the state/multiple states)

Figure 2.9 Reinterpreting the nationalist position – Regionalism

Global justice question: populations to which nationalists recognise a special duty (RN+AN)
i.e. the set of people who count

Populations to which nationalists recognise limited, general duties of humanity (AF)

General allocation question: investing in the worst-off - equal claims by AN (across a region)
i.e. who it is that gets priority within that set

Since South Africa contains nearly as much diversity as can be found throughout the region,[36] there are scarcely stronger national ties than regional ties. It is therefore difficult for nationalists to draw on a principle that applies South African nationalism to justify partiality to South Africans who are absolutely poor, when the same principle could equally apply to the region and justify partiality to the absolutely poor across the region. The resource distributor therefore has an equal duty of rescue to all the absolutely poor, domestically and abroad.

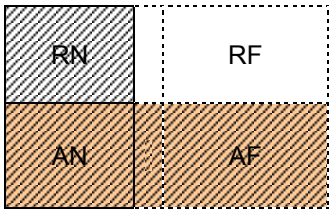


Figure 2.10 The nationalist position with limited resources - prioritising the worst-off

Global justice question: populations to which nationalists recognise a duty
i.e. the set of people who count

General allocation question: investing in the worst-off - equal claims to rescue by AN and AF
i.e. who it is that gets priority within that set

[36] South Africa has 11 official languages, which along with ethnic differences, separate the population both geographically and culturally into smaller groups.

2.4.2 Interim conclusion: equal claims by the absolutely poor domestically and abroad

Up until this point, we have established how each of the three theoretical positions would answer the global justice question with respect to limited resources for assistance of any sort. Each theory delineated a set of people who count i.e. who it is that might get a share of those resources. The resource distributor has duties to all of those people within the set. Assuming investing in the worst-off is what treating this set of people fairly entails, we prioritise the absolutely poor. Since the specific duty to rescue trumps both duties of justice and special duties to co-nationals, then cosmopolitans, statists and nationalists alike would recognise equal claims (to rescue), based on need, by the absolutely poor domestically (AD), the absolutely poor within the nation (AN) and absolutely poor foreigners (AF).

2.5 Reframing the global justice question as two separate questions

As has been outlined above, theorists usually frame the global justice question as three positions addressing the same question, the question of which set of people count. The differences between, and within, these three theoretical positions are many and complex. For clarity, it might be better to reframe this as two separate questions. When it comes to addressing the needs of the absolutely poor: 1) Do political boundaries matter? and 2) Do allegiances, such as national allegiances, matter?

2.5.1 Do political boundaries matter?

The first question is whether or not political boundaries matter. Answering this question usually entails answering the question of whether some version of cosmopolitanism *or* statism is the right view. With respect to my question, whether

one thinks that political boundaries are important (statism), or not (cosmopolitanism), does not seem to matter. If investing in the worst-off is in fact the correct answer to the general allocation question, and if we accept that the duty to rescue trumps any duties of justice, then the cosmopolitan and statist arguments give the same conclusion: recognition of equal duties to the absolutely poor, independent of location. For South Africa this would translate into equal duties to the absolutely poor within their own country and the absolutely poor in other countries. This might include the absolutely poor in countries that are close geographically and politically such as Zimbabwe or Botswana or the absolutely poor in countries more removed such as India or Bangladesh.

2.5.2 Do allegiances, such as national allegiances, matter?

The second question is whether allegiances, such as national allegiances, matter. Should the ties between co-nationals make a difference? In this respect, whether one believes that political boundaries matter or not, one might also think that national allegiances matter. So, even if one is a cosmopolitan who thinks that political boundaries *do not* matter, one might think that national allegiances do. Also, if one is a statist who thinks that political boundaries *do* matter, one might think that national allegiances matter too.

Just as shared citizenship is not a morally defensible reason to favour the absolutely poor domestically over absolutely poor foreigners in a rescue scenario, neither is shared nationhood. If we accept that the duty to rescue trumps duties to co-nationals then a nationalist would recognise equal duties to the absolutely poor both within and beyond the nation. For South Africa, this translates into equal duties to the absolutely poor within and beyond their national borders. Again, this might include the absolutely poor in countries that are close geographically and politically such as Zimbabwe or Botswana or the absolutely poor in countries more removed such as India or Bangladesh.

2.5.3 A permissible way to prioritise spending: the efficiency principle

Having established which people count, and knowing that we have an equal duty to the absolutely poor everywhere, it is still necessary to find a permissible way to prioritise spending. This is because a middle-income country does not have the resources to rescue the absolutely poor everywhere. So, while South Africa might have equal duties to *all* the world's absolutely poor, they would practically not be able to help all these people given their limited resources. There are many more people amongst the global worst-off that need to be rescued than can be. Since prioritization within this set would not be morally permissible on the grounds of shared citizenship, nor on the grounds of nationhood, are there morally defensible grounds for narrowing this population that has a claim on South Africa's health research resources? I believe there is a morally defensible principle we can use to prioritise amongst the world's absolutely poor, namely the principle of efficiency.

Once again I return to the lifesaving example, but this time let us imagine that there are three people drowning. Two of these people are relatively close to each other, as well as relatively close to the lifesaver, the third is further away from all. The South African lifesaver has a choice of saving two people vs. saving one. Because this is a rescue scenario, and because the best interpretation of the duty to rescue is that each person should be given an equal chance of being rescued based on need, all three people have an equal claim to being rescued. But faced with the choice of saving two lives rather than one, it would certainly be morally permissible for the lifesaver to choose to save two i.e. to get "the biggest bang for his buck." Similarly, if there is a subpopulation of the absolutely poor, which South Africa can help more efficiently than other subpopulations i.e. they would be able to rescue more people in this subpopulation than in others for the same investment, then they are permitted to prioritise this subpopulation over others. I believe that this is true for the subpopulation of Sub-Saharan Africa.

There are a number of facts about this African region that point to a rescue scenario in which more lives could be saved in this region compared with others, with the

same investment of resources. Relevant to the distribution of health research resources, *shared disease burden* is the first of these facts. Chapter 4 details regional similarities and differences in the disease burden of the worst-off, but for now, it is sufficient to note that South Africa's disease burden is more similar to the disease burden of the Sub-Saharan Africa region than to any other. HIV and AIDS, and tuberculosis (TB), as well as respiratory infections and diarrhoeal diseases are shared by the worst-off across the region, so investing in health research to address the needs of the worst-off outside of South Africa might not be a far stretch from the research South Africa is already carrying out in these disease areas. Comparatively, the worst-off in South Asia do not share the disease burden of South Africa to the same extent. Again, Chapter 4 illustrates regional similarities and differences in the disease burden of the worst-off but for now it is sufficient that South Africa would have to expand its current health research repertoire in order to meet the needs of the worst-off in South Asia, an exercise that would be far more costly than focusing only on the African region.

Although the disease burden is largely similar, there are some diseases that South Africa does not share with the rest of the region. These include malaria, sickle cell disease, and some of the neglected tropical diseases (see chapter 4). This detracts from the degree to which this population can be efficiently served. Nonetheless, shared disease burden is not the only factor that makes it more efficient for South Africa to focus on sub-Saharan Africa. Economic links, a shared geographical space, shared resources, and a history of working together as a region all point to an established infrastructure for mutually beneficial action and result in South Africa being able to help more people for less cost. While South Africa would still recognise equal claims by the absolutely poor everywhere, given the greater efficiency of investment in Sub-Saharan Africa than in other subpopulations, it would be morally permissible for South Africa to prioritise the discharge of their duties within this region i.e. to discharge its duty to rescue absolutely poor foreigners who are African before absolutely poor foreigners everywhere else.

Given that a middle-income country like South Africa with limited resources is not able to assist everyone in absolute poverty, and that some "regionalist" priority is permissible, South Africa has equal duties to the absolutely poor inside and outside of its state borders, it is morally permissible, in line with the principle of efficiency, for South Africa to focus its limited resources on Sub-Saharan Africa. This would translate into equal duties to the absolutely poor within South Africa and to the absolutely poor in other countries within the region. It would make sense for South Africa to focus on their duties to these populations within the region, rather than on the absolutely poor in countries more removed such as India or Bangladesh.[37]

2.6 Conclusion

Many accept that rich countries have obligations to poor countries. In this chapter I considered what obligations a middle-income country like South Africa might have to poorer populations. With limited resources, a middle-income country cannot meet their duties to everyone in absolute need. What is needed, then, is a sound method, based on sound principles, for prioritizing the distribution of its limited resources.

In this chapter I argued that when fulfilling duties to the *absolutely* poor, political boundaries are not morally important and cannot be used to prioritise some people's needs over those of others. Similarly, national allegiances are not a morally legitimate reason to favour absolutely poor co-nationals over absolutely poor non-nationals. This is because the duty to the absolutely poor is a specific duty to rescue. This rescue duty trumps justice duties; it also trumps special duties of co-nationality. This translates into equal claims by the global absolutely poor everywhere on South Africa. Given that a middle-income country like South Africa with limited resources is not able to assist everyone in absolute poverty, however, we must find a morally

[37] The degree to which we may prioritize these populations is a complex question. Great needs of other people could outweigh the permission to prioritize small needs of our fellow Africans. However, given the limited resources and huge

defensible way to prioritise within this set. Focusing on the region is morally permissible because this is in line with the efficiency principle and so will in most cases produce a larger overall benefit. Applied to the original question of supporting health research, South Africa has an obligation to support health research for the absolutely poor beyond its state borders, and it would be permissible for South Africa to prioritise the health research relevant to the absolutely poor in sub-Saharan Africa.

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needs of the worst-off in sub-Saharan Africa, this is likely not to be an issue.

3 Global health research priorities and how spending corresponds

Health is an important component of general welfare; poor health is one of the most important causes of material deprivation. Aspiring to meet health needs is therefore instrumental in improving general welfare. Health research is one mechanism that can contribute to health improvement and health systems enhancement.[38] One of the critical roles of health research is to ensure that measures proposed to address health are based on evidence so that resources available to finance these measures are used in the most efficient way. One way to effectively utilize resources is through ensuring that appropriate funding is directed towards health research *priorities*. Although this is of paramount importance in order to address diseases of poverty, it is also important in resource-rich settings, as shown by the report on priority setting within the United States National Institutes of Health (37).

The significance of appropriately directing funds to health research priorities is however, much more acute in terms of global justice. Scarce health research funding is a challenge for many countries, but is particularly acute in low- and middle-income countries, which have limited financial resources to fund necessary research themselves and a low priority given to their national health problems by the global health research community. Health research in many of these countries faces two key challenges: 1) a lack of clarity on actual national health research priorities and/or a lack of the research governance and management systems needed to develop, communicate and implement them; and 2) the influence of international health research programmes, that often pay insufficient attention to these health research priorities as they design and implement their programmes. International health research programmes and donors can distort country research agendas and sometimes undermine national health research systems. Consequently, health research in low-

[38] There is a balance between investing money in health research vs. investing in other interventions that might improve health. For the purposes of this chapter, I will take it as fixed that there will be a certain amount of money directed at health research. I will address how this money ought to be used.

and middle-income countries is often not aligned with the actual health research priorities in these countries (38). In the cases that research does fit some of these priorities, there are often not enough of the relevant *types* of research needed within these categories. Not only do low- and middle-income countries need to develop capacity to identify health research priorities and conduct relevant health research, but there also needs to be a greater sense of accountability of health research globally (39). Historically, there has been a pervasive global disparity between disease burden and health research funding with an imbalance in the application of research resources to address the health needs of poor populations (40). Essentially, too little funding for research was, and for the most part still is, being devoted to the health problems of poor and disadvantaged populations.

Tracking the distribution of global funding for health research is an important mechanism for assessing to what degree funding maps onto actual health research priorities. It helps to identify specific gaps in needed health research with regard to specific diseases and geographical areas. In the previous chapter I argued that South Africa has equal duties to the world's absolutely poor, but that it would be morally permissible to prioritise the absolutely poor in the African region. In this chapter I provide an overview of established health research priorities[39] and how spending does or does not correspond. I frame the presentation of this data in answers to four separate, but related, questions:

1. How do global health research investments map onto global health research priorities?
2. How do South Africa's health research priorities compare with Africa's?
3. How do global investments in South Africa's health research priorities compare to global investments in Africa's health research priorities?
4. How do global health research investments map onto the *types* of health research needed in low-income settings?

[39] For clarity, when I refer to "established" or "documented" health research priorities, this points to health research priorities that have been determined by a responsible institution or organization. This is distinct from the health research priorities that I believe a government ought to endorse.

By addressing these questions I will show not just distribution of spending according to health research priorities but also *how* South Africa's previously established duty to the absolutely poor in the African region is being, and can be, met.

3.1 How do global health research investments map onto global health research priorities?

In this section I provide an overview of how global spending on health research maps onto global health research priorities. Looking at this data is informative in identifying gaps between established health research priorities and global funding efforts. Identifying these gaps provides an evidence base from which global health programmes, funding organisations, and governments can better appreciate and focus their activities and resources on specific health research needs, particularly if these health research needs represent under- or unaddressed health research areas. More relevant specifically to this thesis, this evidence base helps to inform *how* South Africa should fulfil its previously established duty to the absolutely poor. Before reviewing the data we could surmise that if South Africa has equal duties to all the world's absolutely poor, and if global spending does *not* map onto global health research priorities, for example, if it is skewed to high-income countries' health research priorities, then one way in which South Africa might begin to fulfil its duty is to advocate for a shift in funding to health research priorities relevant to the absolutely poor.

So what are the global health research priorities? The reality is that no global health research priorities have been established. This in itself is telling of a general lack of alignment in global efforts relevant to health research planning, activities and resource allocation. This is so for a number of reasons, including that proposed

methods for health research priority setting are not all the same.[40] As a proxy for global health research priorities, one can look to global burden of disease data. This data is however not ideal because global burden of disease does not map exactly onto health research priorities. When identifying health research priorities one should not only consider burden of disease in isolation. Other considerations include: the extent of previous research, the potential for the research to have an important effect on disease burden, cost-effectiveness, feasibility of research, the likelihood that the research will be successful, and the particular *type* of research needed – for example implementation and operational research versus biomedical.[41]

Nonetheless, working with the data that we *do* have the closest proxy data for global health research priorities is global burden of disease data. With this in mind it is necessary to reword the original question to represent the data that is available. So, instead of asking how global health research spending maps onto global health research priorities, the question becomes: How does global health research spending map onto global burden of disease? Again, relevant to the broader thesis question, we could surmise that if South Africa has equal duties to all the absolutely poor in the African region, and if global health research spending does not map onto global burden of disease, for example, if it is skewed to high income countries' burden of disease, then one way in which South Africa may be able to instantiate its duty might be to advocate for a shift in funding to the comparatively neglected burden of disease affecting the absolutely poor in the African region.

The WHO Commission on Health Research for Development conducted the first exercise to track global health research funding (40). Published in 1990, their report was the first to draw attention to the disparity between global disease burden and global health research funding. Poor and disadvantaged populations had the highest disease burden globally but received a very small share of global resources.

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[40] A number of methods have been proposed for health research priority setting over the last two decades. Not all of them are in agreement as to the best method for setting health research priorities. Table 4.1 in Chapter 4 provides an overview of global health research priority-setting exercises. Appendix B provides a more detailed description of some of the major global health research priority setting exercises conducted over the past two decades.

[41] This list represents some of the common features and criteria of most of the tools and methods for priority setting.

Symbolised by the now well-known expression "10/90 gap," this imbalance essentially indicated that 90% of worldwide resources for health research were being spent on 10% of the global disease burden. Twenty years after the 10/90-gap report, a gap between health research funding and burden of disease still exists and has become widely recognised. In an attempt to bring attention to the need for focused health research in the areas in which it is most needed, a number of publications, websites and conferences have further addressed health research priorities and the Global Forum for Health Research has continued to regularly track *where* and *on what* health research resources are spent. The regular tracking of these resources reported in annual reports by the Global Forum identifies specific gaps in funding for diseases according to geographical area (41). In the following section I first give an overview of the current data on global disease burden, both by cause type[42] and income sector. I then give an overview of global health research funding flows.

3.1.1 Global burden of disease - an imperfect proxy

One summary measure of health that gives a good indication of the burden of disease is the disability adjusted life year (DALY). One DALY represents one year lost of healthy life. It is used in burden of disease reports as a single measure to quantify the burden of diseases, injuries and risk factors. DALYs essentially combine years of life lost due to death and equivalent years of life lost through being in a state of poor health or disability. The more DALYs reported for a given condition in any population, the worse the population is affected by that condition. The following section reports on DALYs by cause type and by income-sectors globally. There is considerable variation in burden of disease between high- and low-income countries. There are two salient differences: 1) The *cause type* of disease is different; and 2)

[42] The Global Burden of Disease study classifies disease burden into three broad cause types: Group I – communicable, maternal, perinatal and nutritional conditions; Group II – noncommunicable diseases; and Group III – injuries.

There is a vastly different *magnitude* of disease burden by income sector. DALYs in low-income countries are seven times higher in total than in high-income countries.

*Burden of disease **cause type** differs by income group*

The two leading causes of disease burden globally are infectious diseases: lower respiratory infections and diarrhoeal diseases. Together these two causes account for 167.3 million DALYs globally (11% of the total global disease burden). HIV/AIDS is now the fifth cause of disease burden globally. Unipolar depressive disorders and ischaemic heart disease feature prominently as leading noncommunicable diseases and together account for 128.1 million DALYs globally (8.4% of global disease burden). Both make a large contribution to disease burden, being at third and fourth place globally, eighth and ninth place in low-income countries and the leading causes in high- and middle-income countries.[43] The leading causes of disease burden in low-income countries are broadly similar to those globally, apart from malaria and TB. Eight of the top ten causes in low-income countries and six of the top ten causes globally are Group I causes, i.e. communicable diseases, maternal, perinatal, and nutritional conditions. The leading causes in high-income countries are however different. With the exception of road traffic accidents, all the top ten causes of disease burden in high-income countries are Group II causes, i.e. noncommunicable diseases (Table 3.1).

[43] Both Unipolar depressive disorders and Ischaemic heart disease could plausibly be reduced given the availability of effective treatments and prevention packages: effective treatments for depression are available, and cigarette smoking is a major and entirely preventable contributor to the burden of disease from Ischaemic heart disease.

Table 3.1 Leading causes of disease burden by income sector (2004)

	Disease or injury	DALYs (million)	% of total DALYs
	World		
1	Lower respiratory infections	94.5	6.2
2	Diarrhoeal diseases	72.8	4.8
3	Unipolar depressive disorders	65.5	4.3
4	Ischaemic heart disease	62.6	4.1
5	HIV/AIDS	58.5	3.8
6	Cerebrovascular disease	46.6	3.1
7	Prematurity and low birth weight	44.3	2.9
8	Birth asphyxia and birth trauma	41.7	2.7
9	Road traffic accidents	41.2	2.7
10	Neonatal infections and other §	40.4	2.7
	Cumulative	568.1	

	Disease or injury	DALYs (million)	% of total DALYs
	Low-income countries		
	Lower respiratory infections	76.9	9.3
	Diarrhoeal diseases	59.2	7.2
	HIV/AIDS	42.9	5.2
	Malaria	32.8	4.0
	Prematurity and low birth weight	32.1	3.9
	Neonatal infections and other §	31.4	3.8
	Birth asphyxia and birth trauma	29.8	3.6
	Unipolar depressive disorders	26.5	3.2
	Ischaemic heart disease	26.0	3.1
	Tuberculosis	22.4	2.7
	Cumulative	380.0	

	Disease or injury	DALYs (million)	% of total DALYs
	Middle-income countries		
1	Unipolar depressive disorders	29.0	5.1
2	Ischaemic heart disease	28.9	5.0
3	Cerebrovascular disease	27.5	4.8
4	Road traffic accidents	21.4	3.7
5	Lower respiratory infections	16.3	2.8
6	COPD *	16.1	2.8
7	HIV/AIDS	15.0	2.6
8	Alcohol use disorders	14.9	2.6
9	Refractive errors	13.7	2.4
10	Diarrhoeal diseases	13.1	2.3
	Cumulative	195.9	

	Disease or injury	DALYs (million)	% of total DALYs
	High-income countries		
	Unipolar depressive disorders	10.0	8.2
	Ischaemic heart disease	7.7	6.3
	Cerebrovascular disease	4.8	3.9
	Alzheimer and other dementias	4.4	3.6
	Alcohol use disorders	4.2	3.4
	Hearing loss, adult onset	4.2	3.4
	COPD *	3.7	3.0
	Diabetes mellitus	3.6	3.0
	Trachea, bronchus, lung cancers	3.6	3.0
	Road traffic accidents	3.1	2.6
	Cumulative	49.3	

* COPD, chronic obstructive pulmonary disease
§ This category includes other non-infectious causes in the perinatal period apart from prematurity, low birth weight, birth trauma and asphyxia. These non-infectious causes are responsible for about 20% of DALYs shown in this category.

Group I: Communicable, maternal, perinatal and nutritional conditions
Group II: Noncommunicable diseases
Group III: Injuries

Source: I adapted this table from WHO's Global Burden of Disease 2004. Available at: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_part4.pdf; Leading causes of disease burden essentially capture approximately 40% of burden of disease

While low-income countries are to a great extent more heavily burdened by infectious diseases and conditions related to childbirth and pregnancy (Group I causes), they also suffer from some of the problems that affect high-income countries. Essentially they are affected by a dual burden of disease. Group II causes (noncommunicable diseases) now account for a third of the disease burden in low-income countries and over half of the burden of disease in middle-income countries. The only region that this is not true for is Africa, whose disease burden is still dominated by Group I causes (71%). Despite this dual burden of disease in many

low- and middle-income countries, the distribution of causes of disease burden remains largely different by income sector (Figure 3.1).

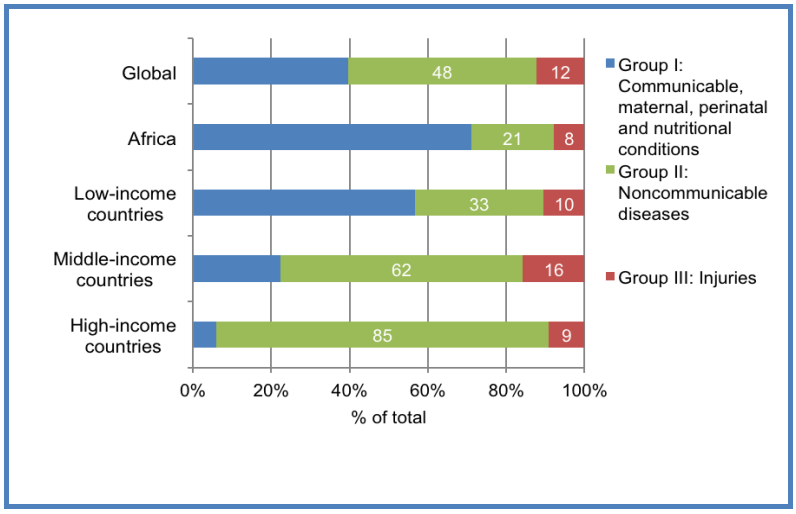

Figure 3.1 Distribution of causes of disease burden

Source: I sourced the data for this figure from: WHO Burden of disease 2004. Annex A: Deaths and DALYs 2004 Annex tables. Available at: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_AnnexA.pdf

*Burden of disease **magnitude** differs by income group*

There is not only a large difference in the distribution of causes of disease burden between low and high-income countries, but also, and perhaps more importantly, in the quantity of DALYs in each income sector of the world. The top ten causes of disease burden in low-income countries account for 380 million of the world's DALYs, while in high-income countries the top ten causes account for 49.3 million DALYs (Table 3.1). The magnitude of *total* disease burden in each income sector reflects similar disparities. The magnitude of disease burden in low-income countries

(827 million DALYs) is more than the magnitude of disease burden for middle- and high-income countries combined (700 million DALYs) (Figure 3.2).

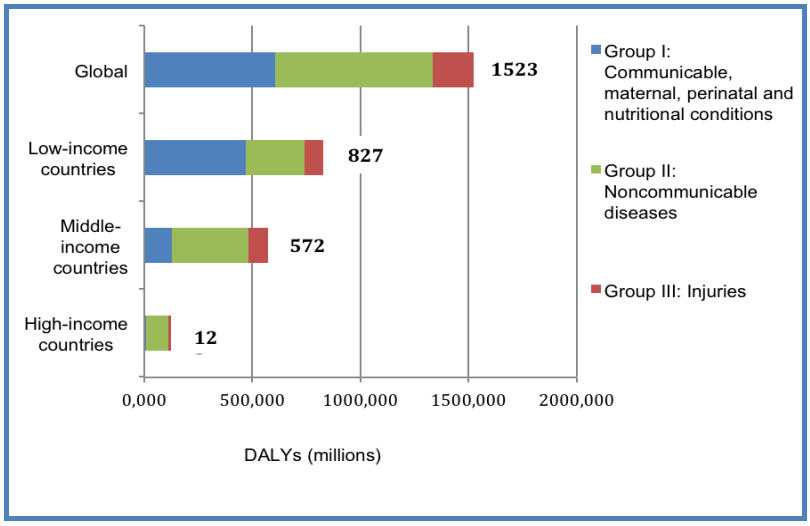

Figure 3.2 Magnitude of total disease burden by cause by region (DALYs in millions)

Source: I sourced the data for this figure from: WHO's Burden of disease 2004. Annex A: Deaths and DALYs 2004 Annex tables. Available at: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_AnnexA.pdf

The distribution of causes of disease burden in low-income countries is markedly different than that of middle- and high-income countries, as is the magnitude of disease burden. These differences are relevant since, at least for cosmopolitans, there must be a very good reason for global health research funding not to reflect and respond to these disparities.

3.1.2 The distribution of global health research funding

In this section, I present data on the distribution of global health research funding. Data on investments in health research provide an indicator of how funders are

prioritizing their investments, as well as trends, overlaps and gaps. The Global Forum for Health Research, the organisation that has continued to regularly track *where* and *on what* health research resources are spent, reports a continued increase in global health research funding since their original report in 1986 (41). As an indicator of funding sources, the 2008 report of the Organisation for Economic Cooperation and Development (OECD) indicates that of the US$160.3 billion spent on global health research in 2005:

1. $81 billion (51%) was invested by the private-for-profit sector (72% of this, or $59 billion was invested by US pharma);
2. $ 66 billion (41%) was invested by the public sector (53% of this, or $35 billion was invested by the US government); and
3. $ 13 billion (8%) was invested by the private not-for-profit sector

Of this US$160.3 billion spent on global health research, $155 billion (97%) is high-income country spending. Low- and middle-income countries invest the remaining $5 billion (3%). Most of the $155 billion spent by high-income countries goes towards products, processes and services tailored to their own health-care markets. For example, of the $81 billion invested by the private-for-profit sector, two percent was spent on health research in low and middle-income countries.[44] The United States is the largest funder of the world's health research, both in the private and public sectors. As one of the major players, it is illustrative to outline where funding from the US is going, as an indicator of distribution of global health research funding.

[44] In 2007 research and development investments by Pharmaceutical Research and Manufacturers of America (PhRMA) member companies totalled US$44.5 billion. Most of this (US$35.4 billion; 79.5%) was spent on domestic research and development. US$9.1 billion (20.5%) of investments were spent abroad. See Burke, M. and Matlin, S. (eds). (2008). Global Forum for Health Research, Monitoring Financial Flows for Health Research 2008: Prioritising research for health equity.

Table 3.2 United States funding for biomedical research by therapeutic area (2005)

	US$ (billions)	%		
Neuroscience	13.6	25.3	Group II:	US$36.6 billion (68%)
Oncology	8.8	16.4		
Cardiovascular	8.4	15.6		
Endocrine	5.8	10.8		
Infectious disease	5.4	10.0	Group I:	US$ 15.5 billion (29%)
HIV/AIDS	5.0	9.3		
Gastrointestinal	2.9	5.4		
Respiratory	2.2	4.1		
Genitourinary	1.7	3.2		
Total	**53.8**	**100.0**		

Source: I sourced data for this table from: Dorsey ER, Thompson JP, Carrasco M, de Roulet J, Vitticore P, et al. (2009) Financing of U.S. Biomedical Research and New Drug Approvals across Therapeutic Areas. PLoS ONE 4(9): e7015. Available at: http://www.plosone.org/article/info:doi%2F10.1371%2Fjournal.pone.0007015

Dorsey et. al., (2009) report on US financing of biomedical research across therapeutic areas by both industry and the National Institutes of Health (42). They sought first to estimate United States funding by therapeutic area and second to determine whether this funding is aligned with disease burden. This report gives us only a rough indicator of just how much funding is being directed to different causes of disease burden as the authors focused on just nine therapeutic areas. Their findings show that 68% ($36.6 billion) of the funding directed at these nine areas goes towards four of them: neuroscience, oncology, cardiovascular, and endocrine research (all Group II disease causes). Infectious disease, HIV/AIDS, gastrointestinal and respiratory research (Group I causes) received $15.5 billion (29%) of total funding. Dorsey et al found total funding to be broadly correlated with disease burden in high-income countries. Funding was not aligned with global burden of disease.[45] Funding

[45] Interestingly, if we look at funding distribution separately by industry and NIH, industry funding was more strongly aligned with disease burden in high-income countries than with global disease burden. NIH funding, however, was more strongly aligned with global disease burden. This makes sense knowing that the principle difference between NIH and industry is the differential funding of HIV/AIDS and infectious diseases. Industry funds the majority of research as a whole; however NIH provided the majority of support for HIV/AIDS (59%) and infectious diseases (54%). Overall

was also not aligned with the disease burden of the poor (Table 3.3). Spending by the United States on global health research therefore did not reflect the disparities in disease burden cause type and magnitude discussed in section 3.1.1 above.

This discrepancy accentuates the importance of foundations, such as the Bill and Melinda Gates Foundation, the Rockefeller foundation, and the Global Fund, whose health research funding priorities reach beyond the needs of high-income countries. Funding by these foundations is however extremely small relative to private-for-profit and public investments. The Global Fund for example spent on average US$3.2 billion annually between 2008 and 2010. Approximately four percent (US$128 million) of this went towards research (43). Other philanthropic funding for health research amounted to $538 million in 2007 (44). These amounts are just a drop in the ocean of the US$160.3 billion reported spent on global health research in 2005. They are even small relative to the US$15.5 billion spent by the United States pharmaceutical industry and National Institutes of Health in 2005. Even if we add philanthropic health research funding to the spending reported by Dorsey, one can see that they do not sway the global distribution of health research funding to reflect the global distribution of disease burden (Table 3.3).

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however, the distribution of funding for health research remains skewed to the burden of disease in middle- and high-income countries.

Table 3.3 Cause of disease burden as a percentage of total burden of disease in each income sector, compared with funding by cause of disease burden

	Cause of disease as a percentage of total Burden of Disease					US public and private funding	US public/private funding AND Philanthropic funding
	Global	Africa	LIC	MIC	HIC		
Group I:	40%	71%	57%	22%	6%	29%($15.5b)	29.8%($16.038b)
Group II:	48%	21%	33%	62%	85%	68%	68%
Group III:	12%	8%	10%	16%	9%	-	-

Source: I sourced the data for this table from: WHO's Burden of disease 2004. Annex A: Deaths and DALYs 2004 Annex tables. Available at: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_AnnexA.pdf; Dorsey ER, Thompson JP, Carrasco M, de Roulet J, Vitticore P, et al. (2009) Financing of U.S. Biomedical Research and New Drug Approvals across Therapeutic Areas. PLoS ONE 4(9): e7015. Available at: http://www.plosone.org/article/info:doi%2F10.1371%2Fjournal.pone.0007015; The Global Fund (2010). The Global Fund Annual Report 2009. Available at: http://www.theglobalfund.org/en/library/publications/annualreports/; and G-Finder. (2009). Neglected Disease Research and Development: New Times, new trends. Available at: http://www.georgeinstitute.org/g-finder-2009-neglected-disease-research-and-development-how-much-are-we-really-spending (p.63)

From the data presented in Table 3.3, we see that United States health research spending, the largest contributor to global health research spending, is largely aligned with the distribution of disease burden in middle-income countries, and at least broadly aligned with the distribution of disease burden in high-income countries. The distribution of health research funding does not map onto the global distribution of disease burden, nor does it reflect the disease burden of the poor. The majority of United States funding is directed at Group II causes. The burden of disease in low-income countries (especially in the African region) is skewed to Group I causes. United States spending on global health research is therefore not aligned with the disease burden of low-income countries.

Since these poorer countries suffer a dual burden of disease, and since the biggest health research spenders are investing mostly in Group II causes, then some might assume that the resources directed to health research on these Group II causes will not only benefit high-income countries, but also ultimately low-income countries. I believe this would be true only on the assumption that the *type* of health research needed for each economic region is the same. Many evidence-based innovations

researched and developed in high-income countries fail to produce results when transferred to lower-income settings, mostly because their implementation has not been tested or is unsuitable. Low-income countries need research into *products* that can be used specifically in low-income settings, *implementation* research to ensure that already existing interventions can be effectively integrated into resource-poor health systems, and research to improve health systems themselves (see section 3.4 for a more detailed discussion of this point) (45, 46). The fact that high-income countries are investing in Group II causes therefore does not mean that these investments can be counted as beneficial to low-income countries.

3.1.3 Global health research investments do not map onto global burden of disease

High-income countries account for 97% of spending on health research globally. Since most research is funded by high-income countries, or sponsored by pharmaceutical companies linked to the industry of high-income countries, it is not surprising that the interventions developed by these sponsors are mostly for the benefit of high-income countries. The data presented above shows that causes of disease burden in high-income countries are different from those globally. Causes of disease burden in high-income countries are also different from those in low-income countries. Additionally, the magnitude of disease burden in low-income countries is significantly higher than in high-income countries. This might indicate that a significantly higher amount of research funding should be directed towards them.

United States' investments, which are the largest contribution to global health research spending, do *not* however indicate a higher amount of research funding directed to this higher magnitude of disease burden. Rather, these investments are skewed towards the smaller disease burden in high-income countries. If we assume that U.S. funding is a good indicator of global funding, then this data indicates that global health research funding does *not* map onto global disease burden. Although the gap may not be as large as when the 10/90-gap was originally reported in 1990, the

majority of funding is still going towards health research for high-income country burden of disease. If South Africa has equal duties to all the world's absolutely poor, and if global health research spending does not map onto global disease burden, or onto the disease burden of the poor, then one way in which South Africa might begin to fulfil this duty is to advocate for a shift in global health research funding.

3.2 How do South Africa's health research priorities compare with Africa's?

In this section I compare South Africa's health research priorities with the health research priorities of sub-Saharan Africa.[46] Since South Africa has equal duties to the worst-off in South Africa and the region, identifying where their health research priorities *do* and *do not* overlap is important. Especially for those regional priorities that are not priorities for South Africa, it will make a difference on my account if South Africa pursues only the health research priorities of its worst-off citizens or includes those more broadly relevant to the worst-off in the region. Before looking at the data we could infer that if South Africa has a duty to sub-Saharan Africa's absolutely poor, and if South Africa's established health research priorities are currently different from those of sub-Saharan Africa, then one way in which South Africa may begin to fulfil its duty is to incorporate some of sub-Saharan Africa's established health research priorities into its own research agenda. This would entail a shift in its research focus on national priorities to some combination of national and regional health research priorities.

[46] Statistics for the WHO African Region include data from all the sub-Saharan African countries (except for Sudan, Djibouti and Somalia). In addition they include data from one country outside of sub-Saharan Africa, Algeria. The WHO data for "Africa" essentially represents "sub-Saharan Africa," rather than the broader African region. See Appendix A for a map and list of countries in the WHO African Region.

3.2.1 Health research priorities for South Africa and Africa

Unlike in the global setting, where health research priorities have not been established, health research priorities for both South Africa and the African region have been established.[47] In South Africa, health research priority setting exercises were first undertaken in 1994 during the country's first Essential National Health Research (ENHR) meeting. Preliminary workshops in 1995 and 1996 identified a number of priority research areas, and developed the criteria and process on prioritisation, which were used to guide further ENHR work. The first national ENHR Congress on priority setting was held in 1996. A list of health research areas were identified which served to guide health research in South Africa for the subsequent years. The second ENHR Congress was held in 2002. Its aim was to popularise the National Health Research Policy, create awareness of the policy and to adopt a new priority setting framework, which incorporated health problems and health system issues that would need to be considered when setting priorities. In 2006, The National Conference on Priority Setting for Health Research built on the work done at the previous conferences. It was decided that research priority setting was to be reviewed at least every 5 years (47). The 2006 conference listed fifteen leading health problems or challenges for research in South Africa. Table 3.4 shows these health research priorities.

[47] For clarity, when I refer to "established" or "documented" health research priorities, this points to health research priorities that have been determined by a responsible institution or organization. This is distinct from the health research priorities that I believe a government ought to endorse, something I touch on later in the chapter.

Table 3.4 South Africa's health research priorities (2006)

Condition	1996 Ranking	2006 Ranking
HIV and AIDS	4	**1**
Injuries	1	**2**
Tuberculosis	2	**3**
Diarrhoea	7	**4**
Perinatal and neonatal mortality	-	**5**
Nutrition	3	**6**
Common risk factors (Hypertension, smoking, overweight, alcohol etc.)	-	**7**
Cardiovascular diseases	-	**8**
Orphans and child-headed households	-	**9**
Maternal morbidity and mortality	-	**10**
Mental Health	9	**11**
Cancer	6	**12**
Malaria	10	**13**
Respiratory infections	8	**14**
Sexually Transmitted Infections	5	**15**

For Africa as a whole there has been only one health research priority setting exercise. During a High Level Ministerial Meeting on Health Research in Africa in 2006, Ministers of Health and Heads of Delegations identified key domains for health research in the African region (Table 3.5) (48). During a two-day technical consultation attended by 39 African delegates[48] and 15 representatives from development partners,[49] delegates made presentations on the current status of health research in their respective countries. Subsequent discussions in background papers and country situation analyses focused on, among other things, the strengths, weaknesses, challenges and needs of African health research systems with respect to priority setting and the role of research in the attainment of internationally agreed health targets, especially health Millennium Development Goals (MDGs). The 2006 meeting listed 6 key domains for health research in the region.

[48] From the following 11 African countries: Algeria, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Senegal, South Africa and Sudan.
[49] Namely WHO, World Bank, UNICEF, COHRED, NEPAD, and REPRONET-Africa.

Table 3.5 Africa's health research priorities (2006)

Key domains for health research	
1	Infectious diseases, including malaria, tuberculosis, HIV and AIDS, emerging infections and neglected tropical diseases (e.g. African trypanosomiasis, Buruli ulcer, leishmaniasis and lymphatic filariasis)
2	Reproductive and sexual health
3	Child health
4	Non-communicable diseases, including cardiovascular disease, diabetes, cancers, sickle cell disease, injuries etc.
5	Malnutrition
6	Mental health, including drug and substance abuse

There is little detail on the methods used for priority setting during this Abuja meeting, and no indication of whether the list is ranked. Burden of disease data that provides estimates of the magnitude and urgency of a particular disease can be used as an imperfect proxy for health research priorities.[50] So, although the Abuja priorities are not explicitly ranked, burden of disease estimates can indicate whether they in fact reflect a rational ranking. One can therefore use both the disease prioritised and the relative ranking as a basis for African priorities. Table 3.6 below displays the leading causes of disease burden in Africa.

[50] As mentioned earlier, disease burden does not always map exactly onto health research priorities because health research priorities are most soundly determined by a number of considerations over and above the magnitude of disease burden. These additional considerations include: the extent of previous research and gaps in knowledge about ways to address the health problem; the possibility of addressing the problem through health research; the feasibility and cost of the proposed research; and the potential outcome, impact and cost-effectiveness of interventions resulting from the proposed research. Disease burden is, however, a good enough proxy when health research priority setting data is not available or when we have reason to question its reliability.

Table 3.6 Africa's leading causes of disease burden (2004)

	Disease or injury	DALYs (millions)	% of total DALYs
1	HIV/AIDS	46.7	12.4
2	Lower respiratory infections	42.2	11.2
3	Diarrheal diseases	32.2	8.6
4	Malaria	30.9	8.2
5	Neonatal infections and other	13.4	3.6
6	Birth asphyxia and birth trauma	13.4	3.6
7	Childhood cluster diseases	12.5	3.3
8	Prematurity and low birth weight	11.3	3.0
9	Tuberculosis	10.8	2.9
10	Road traffic accidents	7.2	1.9
11	Protein-energy malnutrition	7.1	1.9
12	Violence	6.3	1.7
13	Tropical cluster diseases	6.0	1.6
14	Unipolar depressive disorders	5.7	1.5
15	Meningitis	5.3	1.4
16	Cerebrovascular disease	4.9	1.3
17	Cataracts	3.9	1.0
18	Ischaemic heart disease	3.5	0.9
19	STDs excluding HIV	3.4	0.9
20	Iron-deficiency anaemia	2.9	0.8

Source: I sourced data for this table from WHO's Burden of disease in DALYs by cause in WHO regions, Table A2. Available at: http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_AnnexA.pdf

If we map the health research priorities established at the Abuja meeting against magnitude of disease burden for the region, they are broadly aligned (Table 3.7). Also, although it is not specifically stated that the rank of health research priorities corresponds with the order in which they were listed, it appears that this is indeed the case. Infectious diseases and neglected tropical diseases account for 47% of total DALYs in Africa[51] and are listed first in the established health research priorities. Reproductive and sexual health accounts for the next largest percentage (7%)[52] of total DALYs and is listed second in the established health research priorities, and so

[51] I calculated this percentage by adding the % of total DALYs for: HIV, lower respiratory infections, diarrheal diseases, malaria, tuberculosis, tropical cluster diseases, meningitis and STDs.
[52] I calculated this percentage by adding the % of total DALYs for: birth asphyxia and birth trauma, and prematurity and low birth weight.

forth. Throughout the rest of this section I will use both burden of disease data and documented health research priorities to compare South Africa and Africa.

Table 3.7 Africa's health research priorities mapped onto disease burden

Key domains for health research		DALYs	% of total DALYs
1	Infectious diseases	177.5	47.1
2	Reproductive and sexual health	24.7	6.6
3	Child health	25.9	6.9
4	Non-communicable diseases	15.6	4.1
5	Malnutrition	7.1	1.9
6	Mental health	5.7	1.5

3.2.2 A comparison of South Africa and Africa's disease burden and health research priorities

The distributions of disease burden in South Africa and in the broader region are roughly aligned. The WHO reports that for both South Africa and Africa, close to 80% of years of life lost are attributable to communicable diseases, 15% to non-communicable diseases, and 6% to injuries (49). Some estimates for South Africa show a more moderate burden of communicable disease at around 60%, with approximately 30% of disease burden attributable to non-communicable disease and the remaining 10% to injuries (50). Nonetheless, the disease burden for South Africa and the rest of Africa overlap significantly. There is a greater burden of disease due to communicable diseases than there is due to non-communicable disease and injuries. This makes sense since we know that communicable diseases burden the poorest populations and 40% of South Africa's population, along with substantial sections of the populations of many African countries are amongst the worst-off in the world. Figures 3.3 and 3.4 show the maternal mortality ratio and the prevalence of infectious and parasitic diseases globally. For both these indicators it is clear that

Africa is burdened more severely than other regions in the world, and that South Africa and Africa are burdened similarly.

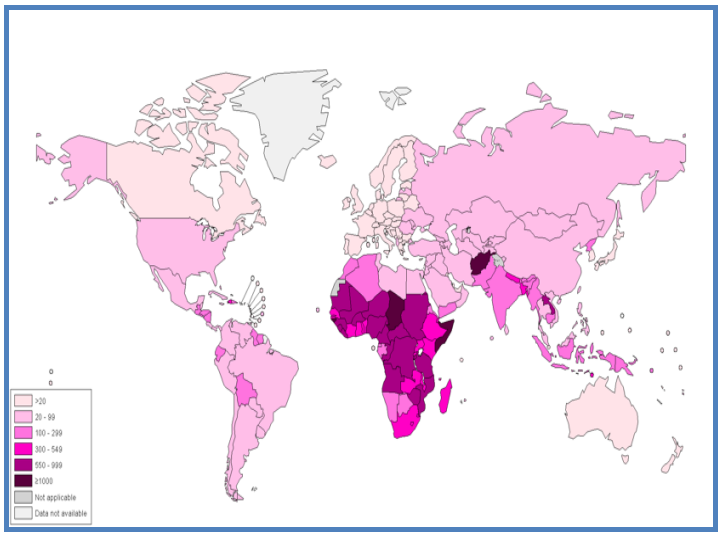

Figure 3.3 Maternal mortality ratio per 100,000 live births (2008)

Source: World Health Organisation (2011). Global Health Observatory Map Gallery. Available online: http://gamapserver.who.int/mapLibrary/Files/Maps/Global_MDG5_2011_MaternalMortality.png

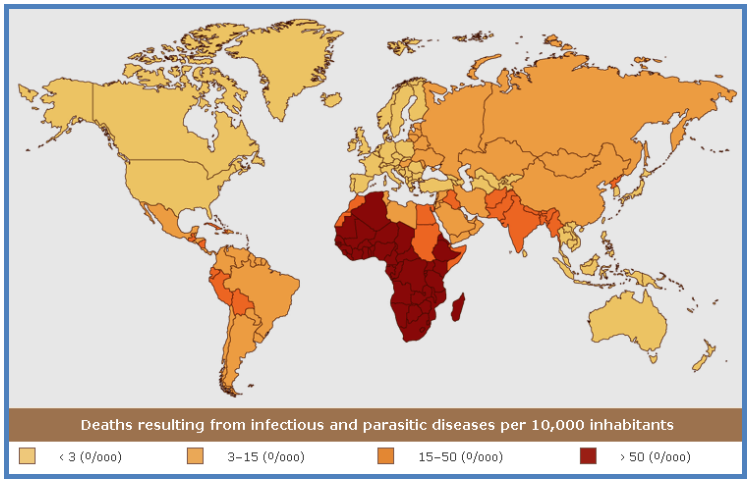

Figure 3.4 Infectious and parasitic disease prevalence (2006)

Source: Fondation Mérieux (2005). Infectious diseases map. Available at: http://www.fondation-merieux.org/infectious-diseases-map

Health research priorities shared by South Africa and Africa

Within this category of communicable diseases, HIV and tuberculosis are two clear examples of infectious diseases that similarly burden South Africa and other African countries. Figures 3.5 and 3.6 below show the most recent prevalence data on these two diseases. South Africa suffers the highest prevalence of HIV in the world and HIV also heavily burdens many other sub-Saharan African countries. The prevalence of tuberculosis across all of sub-Saharan Africa is also high at between 500-750 per 100,000 population for most countries, including South Africa.

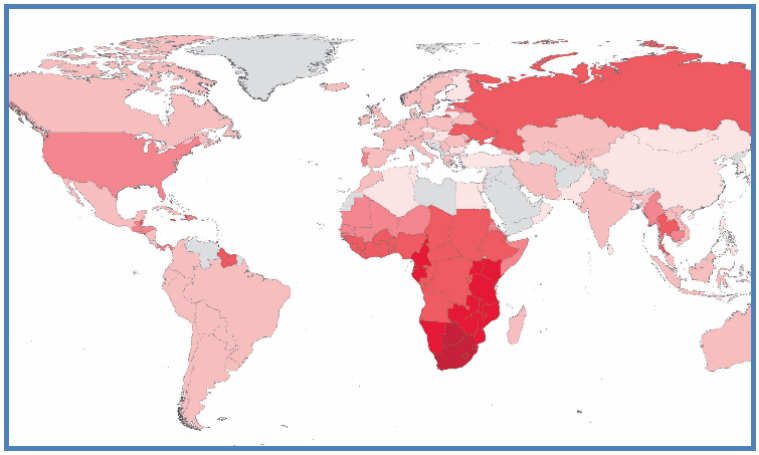

Figure 3.5 HIV prevalence (2009)

Source: UNIADS (2010). A global view of HIV infection: HIV prevalence map. Available at: http://www.unaids.org/documents/20101123_2010_HIV_Prevalence_Map_em.pdf

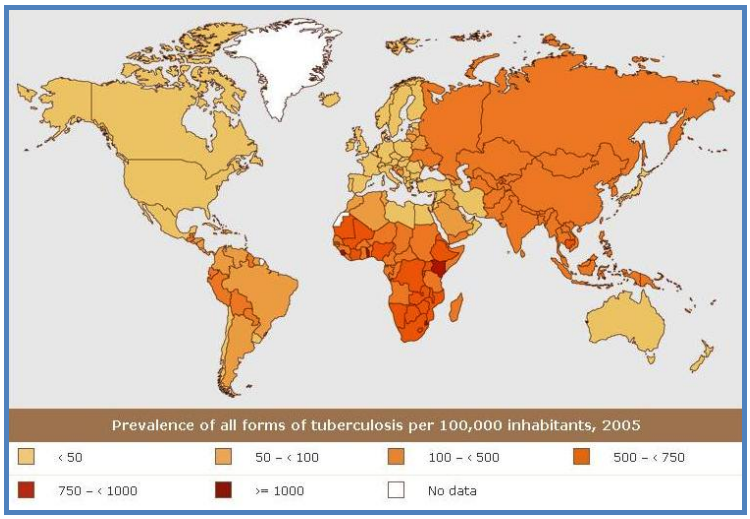

Figure 3.6 Tuberculosis prevalence (2005)

Source: Fondation Merieux (2011). Prevalence of malaria. Available online: http://www.fondation-merieux.org/tuberculosis-map,105

HIV and tuberculosis are ranked at or near the top of established health research priorities for both South Africa and the region and both represent a significant proportion of DALYs in each region. Other causes of disease in the communicable disease category which burden South Africa and other African countries similarly include diarrheal disease, respiratory infections and other causes related to child health. These similarities are reflected in their currently documented health research priorities (Table 3.8).

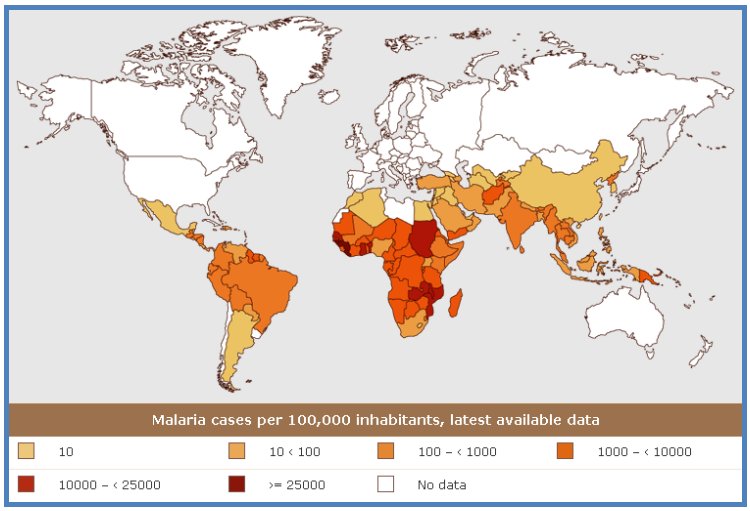

Figure 3.7 Malaria prevalence (latest available data)

Source: Fondation Mérieux (2011). Malaria map. Available at: http://www.fondation-merieux.org/malaria-map

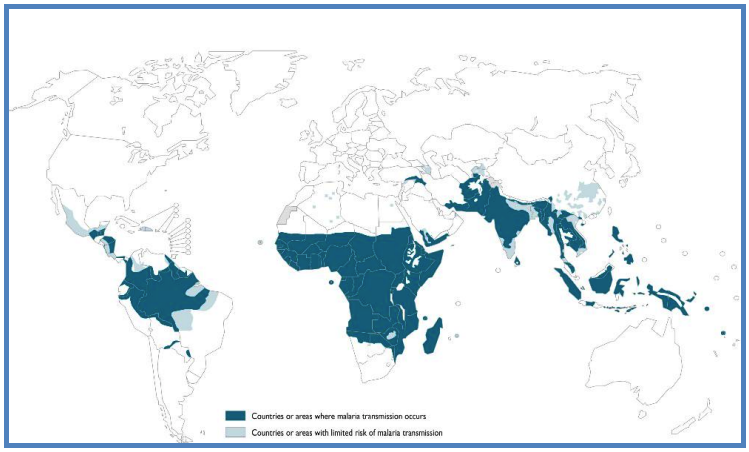

Figure 3.8 Countries or areas at risk of malaria transmission (2010)

Source: World Health Organisation (2011). Global Health Observatory Map Gallery. Available online: http://gamapserver.who.int/mapLibrary/Files/Maps/Global_Malaria_2010.png

Based on prevalence and risk, malaria is not a priority disease for South African citizens (Figures 3.7 and 3.8). It does not even feature in the top 20 causes of death for the country (51). Malaria in South Africa is also confined to three specific geographical areas: 1) the low altitude border areas of the Limpopo province, which

borders on Zimbabwe and Mozambique; 2) Mpumalanga, which is the main thoroughfare to South Africa from Mozambique; and 3) the north-eastern parts of KwaZulu-Natal, although prevalence here is less now due to the successful reintroduction of DDT in 1999 (52). Malaria has been labelled primarily as a border and population movement problem, supported with evidence of a great number of imported malaria cases reported each year (52, 53). Although the prevalence of malaria in South Africa is relatively low compared to the rest of the region, malaria is still included in South Africa's currently documented health research priorities (Table 3.8).

Table 3.8 A comparison of Africa and South Africa's health research priorities

Africa	South Africa
1. Infectious diseases *(Malaria, **TB, HIV**)*	1. **HIV**
Neglected tropical diseases *(African trypanosomiasis, Buruli ulcer, Leishmaniasis, lymphatic filariasis)*	2. Injuries
2. Reproductive and sexual health	3. **TB**
3. Child health	4. Diarrhoea
4. Non-communicable diseases *(Cardiovascular disease, Diabetes, Cancers, Sickle cell disease, Injuries)*	5. Perinatal and neonatal mortality
	6. Nutrition
	7. Common risk factors *(hypertension, smoking, overweight, alcohol)*
	8. Cardiovascular diseases
	9. Orphans and child headed households
	10. Maternal morbidity and mortality
	11. Mental health
	12. Cancer
5. Malnutrition	13. Malaria
6. Mental health including drug and substance abuse"	14. Respiratory infections
	15. Sexually transmitted infections

Health research priorities for Africa but not South Africa

While there is clearly considerable overlap in the established health research priorities and burden of disease for both South Africa and the broader region, there

are other diseases that cause significant disease burden in one and not the other. Most of these are diseases that burden other African countries and not South Africa. Among these are malaria (Figures 3.7 and 3.8), sickle cell disease, and the cluster of neglected tropical diseases, including African trypanosomiasis, Lymphatic filariasis, Leishmaniasis and Buruli ulcer. Figures 3.9 through 3.13 below give us an idea of the distribution of these diseases across the region.

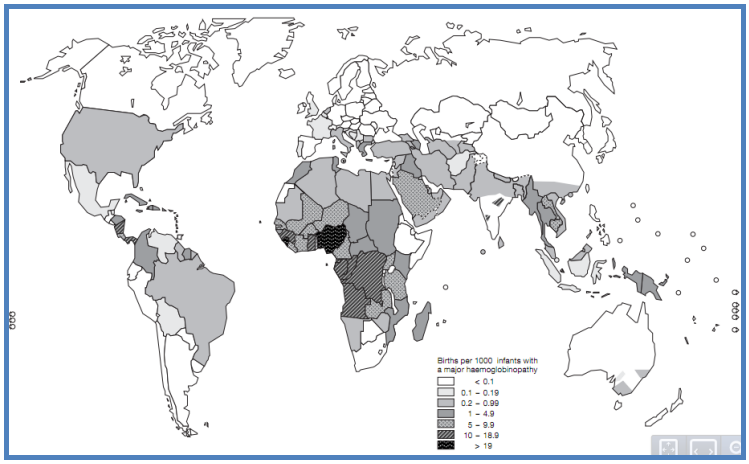

Figure 3.9 Global distribution of haemoglobin disorders, births of affected infants per 1000 births (2012)

Source: WHO (2012). Genes and human disease: Monogenic diseases - Sickle cell anaemia. Available online: http://www.who.int/genomics/public/geneticdiseases/en/index2.html#SCA

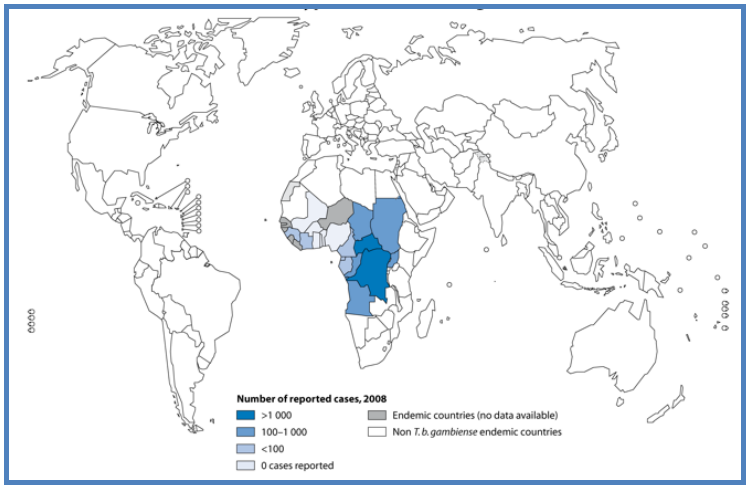

Figure 3.10 Distribution of human African trypanosomiasis (2008)

Source: World Health Organisation (2011). Global Health Observatory Map Gallery. Available online: http://gamapserver.who.int/mapLibrary/Files/Maps/Global_trypanosomiasis_gambiense_2008.png

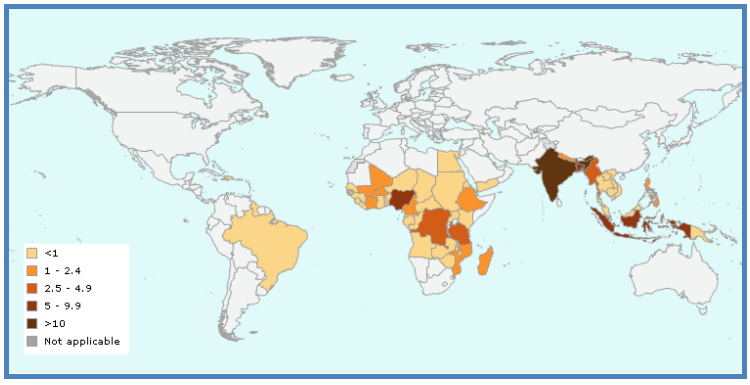

Figure 3.11 Proportion of global population requiring preventive chemotherapy for lymphatic filariasis (2009)

Source: WHO (2009). Lymphatic filariasis: Proportion of global population requiring preventive chemotherapy for lymphatic filariasis 2009. Available at: http://apps.who.int/neglected_diseases/ntddata/lf/lf_status/lf_status.html

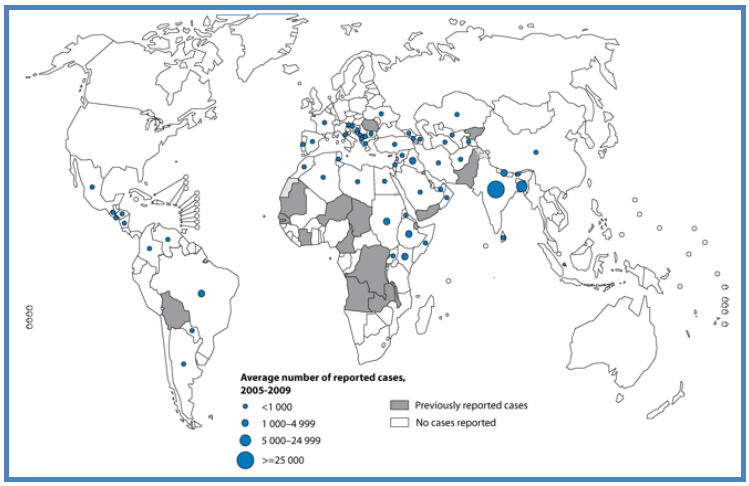

Figure 3.12 Distribution of visceral leishmaniasis (2009)

Source: World Health Organisation (2011). Global Health Observatory Map Gallery. Available online: http://gamapserver.who.int/mapLibrary/Files/Maps/Global_leishmaniasis_visceral_2009.png

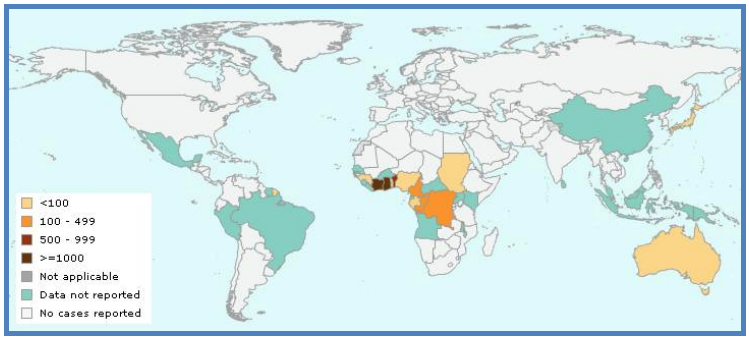

Figure 3.13 Buruli ulcer - number of new cases reported (2010)

Source: WHO (2010). Buruli ulcer, Number of new cases reported 2010. Available at: http://apps.who.int/neglected_diseases/ntddata/buruli/buruli.html

Malaria, sickle cell and the neglected tropical diseases represent a significant burden of disease in Africa and are ranked high on Africa's established list of health research priorities. South Africa does not have a high prevalence of malaria, sickle cell disease, or of the neglected tropical diseases and has therefore not listed these as health research priorities, with the exception of malaria. The case of malaria is an

interesting one. Although South Africa has malaria listed as one of its health research priorities, there is in fact not a high prevalence of this disease within the country.

To summarise, burden of disease and established health research priorities for South Africa and Africa are similar for some causes of disease burden, including many infectious diseases and maternal and perinatal conditions. There are however some causes of disease burden that are health research priorities for Africa but not for South Africa, including sickle cell disease and the neglected tropical diseases.

3.2.3 Implications for South Africa's duty to the absolutely poor in the region

Knowing that there are these similarities and differences in health research priorities helps to inform how South Africa could fulfil its previously established duty to the absolutely poor in the sub-Saharan African region. South Africa has equal duties to all the world's absolutely poor, and it is morally permissible for it to focus on sub-Saharan Africa. If South Africa's health research priorities are different from those of Africa, it makes a difference whether South Africa focuses only on enacting its own national priorities or whether it focuses also on regional health research priorities. Since South Africa's health research priorities do not map exactly onto the health research priorities for Africa, and South Africa has a duty to the absolutely poor in Africa, one has to consider what it would take for South Africa to fulfil this duty. Would it be sufficient for South Africa to continue with its focus only on national health research priorities such as HIV and TB, since these do indeed overlap with priorities in the region? Or would it also be necessary for South Africa to include some of Africa's health research priorities that are not priorities domestically, such as malaria, sickle cell disease and the so-called neglected tropical diseases? In other words, should South Africa begin to fulfil this duty by adjusting its health research focus to include some combination of both national and regional health research priorities?

If we consider South Africa's duty to the absolutely poor in sub-Saharan Africa as *equal* to its duty to the absolutely poor within its own state, then this duty would not simply be fulfilled by South Africa continuing to conduct health research relevant only to South Africa. While pursuing health research on overlapping causes of disease burden such as HIV and TB would inevitably contribute to tackling diseases that are prominent across the continent, this alone might not be sufficient, for two reasons. First, whether this is a way of fulfilling its duty depends on the *type* of research being conducted. For example, if South Africa is already investing in research for HIV, and HIV is also a health research priority for the region, it does not automatically follow that South Africa's pursuit of research for HIV will ultimately benefit other African populations, unless of course the *type* of research is relevant. Some relevant questions might include: if South Africa is investing in HIV drug research, will the end products be accessible and/or affordable for people in other African countries?; If they are doing vaccine research, will the vaccine work for clades or types of HIV in other African countries?; If they are carrying out implementation or operational research on how to successfully implement proven interventions for HIV, then are the results of these studies specific to smaller local populations in South Africa, or would the results be generalizable to other African populations? The answers to each of these types of questions would determine to which extent South Africa is actually fulfilling its duty to the region's absolutely poor.

Second, let us imagine that South Africa commits to conducting the *type* of research relevant to both South Africa and the region on these overlapping health research priorities. This alone might still not be considered sufficient to fulfil its duty to the absolutely poor in the region. If the absolutely poor in South Africa and the region have *equal* claims to South Africa's health research resources, then in order to meet these claims, South Africa ought to commit to some of the health research priorities relevant to the absolutely poor in Africa, that do not affect the absolutely poor in South Africa, such as malaria, sickle cell disease and some of the neglected tropical diseases. Recognising equal duties to the absolutely poor across the region constitutes

a substantially higher commitment. South Africa would have to decide what proportion of funds to invest in regional priorities that are distinct from and therefore compete with its own. It might be that South Africa could fulfil this duty without conducting the needed research itself, for example through directing grants or donor funding towards these diseases or by advocating for needed research. South African researchers could also work with researchers in other African countries and apply for grants for research on these diseases—thereby using South Africa's greater research capacity to build capacity in the region. These would impact less on its own health research budget.

3.3 How do global investments in South Africa's health research priorities compare to global investments in Africa's health research priorities?

In this section I first provide data on donor funding for health research in South Africa compared to other countries in the African region (section 3.3.1). Knowing the funding allocations to South Africa versus the region is informative for how South Africa might fulfil its previously established duty to the absolutely poor in sub-Saharan Africa. If South Africa is receiving more than its fair share of resources compared to other African countries, this might increase South Africa's already existing obligation to absolutely poor Africans beyond its borders. Second, I provide an overview of global funding of *neglected diseases of the developing world* (44). Specifically I report on how this funding is distributed by disease (section 3.3.2). Knowing how global investments in various developing country diseases are distributed allows a comparison of which of these diseases are receiving more or less funding through overall global investment. Finally, I map out which of these neglected diseases of the developing world are shared as health research priorities by South Africa and Africa (section 3.3.3) and which are health research priorities for Africa but not South Africa (section 3.3.4). For those diseases that are shared as

health research priorities by South Africa and Africa, if South Africa has a duty to the absolutely poor in the region, and if South Africa is receiving more than its fair share of resources for these shared priorities, then one way in which South Africa might begin fulfilling its duty is to ensure that the funds it receives for research into these diseases are used to conduct research that will benefit not only its own population but also the region as a whole. For neglected diseases that are health research priorities for Africa but not South Africa, if South Africa has an equal duty to the absolutely poor domestically and in the region, and if funding for Africa's priorities is severely short, then one way that South Africa could fulfil its duty is to advocate for international funding for these, or include them in its own research priorities.

3.3.1 A comparison of donor investment in South Africa and Africa

The United States is the largest funder of health research globally, accounting for 72% of private-for-profit spending, and 53% of public spending globally (41). It is therefore illuminating to outline where funding from the United States is going, as an indicator of the distribution of global health research funding. Within the United States, the National Institutes of Health (NIH) is South Africa's largest funder, so I assume that the distribution of funding from other US sources follows roughly the same pattern (8). Figure 3.5 shows the top 10 countries in sub-Saharan Africa that receive funding for health research from the NIH. In 2005 South Africa received $25 million for HIV research and another $7 million for other health research. The funding received by SA for health research far outweighs that of the other top 10 countries to receive NIH funding in the region.

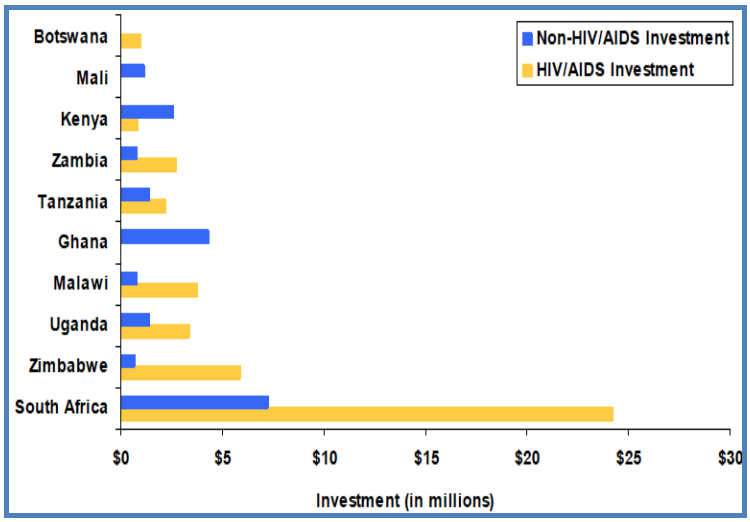

Figure 3.14 Top 10 sub-Saharan Africa countries with NIH health research funding (2005)

Source: Fogarty International Center. Report on NIH international extramural investments in foreign institutions FY 2004- FY 2005. 2009 (p.101)

From the figure above South Africa might be getting more than its fair share of resources compared to other leading African countries that are recipients of NIH funds. It could be that since South Africa has more people living with HIV (an estimated 5.6 million) than any other country in the world (54), there is a legitimate reason for this differential funding, at least for HIV research. South Africa's HIV infections constitute one quarter of the HIV infections in sub-Saharan Africa (22.9 million). It might also be that the greater investment in South Africa is merely a function of South Africa's larger capacity for research. It is unclear from this data whether all of this funding received by South Africa is spent only on research intended to benefit the South African population, or whether some of this funding is directed at health research relevant to the African region more broadly.

3.3.2 A comparison of investments in various neglected diseases of the developing world

The *G-Finder* reports specifically on global investment into research of new products to prevent, diagnose, manage or cure 31 *neglected diseases of the developing world*.[53] The scope of "neglected diseases" covered by G-Finder is determined by applying 3 criteria: 1) The disease disproportionately affects people in developing countries; 2) there is a need for new products i.e. there is no existing product or improved or additional products are needed; and 3) there is market failure i.e. there is no commercial market to attract research and development by private industry. The total reported health research funding for these 31 neglected diseases of the developing world was $2.96 billion in 2008. This amounts to 1.8% of the total global spending on health research reported in 2005 ($160.3 billion) reported earlier.[54]

In this section I provide an overview of how this $2.96 billion is distributed by disease. This data provides a means to compare which of these neglected diseases of the developing world are receiving more or less funding through overall global investment. Table 3.9 lists the eight leading neglected diseases of the developing world. I rank these eight diseases by severity (DALYs) alongside the funding received by each disease in a given year. Presenting the data in this way allows one to get a sense of how many dollars are spent per DALY for each disease. The dollar-per-DALY measure gives a more accurate reflection of to what degree the amount of investment is aligned with the impact of the disease. The neglected diseases receiving the highest number of dollars-per-DALY are the kinetoplastids. Kinetoplastid infections are caused by related parasites and include three diseases: Chagas' disease,

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[53] These *neglected diseases of the developing world* are not the same as what are more commonly known as the neglected tropical diseases. Based on the G-Finder's inclusion criteria, the neglected diseases referred to here include: HIV/AIDS, Malaria, Tuberculosis, Kinetoplastids, Diarrhoeal diseases, Dengue, Bacterial pneumonia & meningitis, Helminth infections, Salmonella infections, Leprosy, Rheumatic fever, Trachoma, and Buruli ulcer. See: Health Policy Division (2009). G-Finder: Neglected disease research and development: New times, new trends. The George Institute for International Health: Sydney, Australia. Available at: http:www.georgeinstitute.org/monitoring-global-rd-investment-neglected-diseases

[54] $2.96 billion (for all neglected diseases) is a much lower figure than that reported by Dorsey et. al. (2009). Dorsey et. al. reported that US spending on Group I causes was $15.5 billion (for infectious disease, HIV/AIDS, Gastrointestinal, and Respiratory). The reason for this discrepancy is that spending reported in G-finder reports only on research investments specifically targeted at developing-country research and development needs i.e. excludes research into products that are

leishmaniasis, and African trypanosomiasis (also known as African sleeping sickness). Kinetoplastids receive $34 per DALY in research funding; this is almost one and a half times more than what is devoted to HIV/AIDS ($20 per DALY), which is often cited as the disease capturing the lion's share of funding. Relatively substantial research investments are also going into HIV/AIDS, malaria and tuberculosis. HIV/AIDS receives $20 per DALY, malaria $16 per DALY and tuberculosis receives $13 per DALY. Comparatively, helminth infections receive much less at $5.6 per DALY. Those neglected diseases that receive the lowest number of dollars per DALY for research are rheumatic fever ($0.5 per DALY), bacterial pneumonia/lower respiratory infections ($1 per DALY) and diarrhoeal disease ($1.8 per DALY). The latter two are particularly problematic as they constitute the two leading causes of disease burden among neglected diseases, and receive an extremely low number of dollars per DALY. Incidentally these two causes of disease burden are also the two leading causes of global disease burden.

Table 3.9 Global investments in the 8 leading neglected diseases

	Neglected disease	2004 DALYs (millions)	2008 Global funding (US$ millions)	$ per DALY
1	Bacterial pneumonia (lower respiratory infections)	93.3	90.8	1.0
2	Diarrhoeal diseases	72.3	132.2	1.8
3	HIV/AIDS	57.8	1164.8	20.2
4	Tuberculosis	34.0	445.9	13.1
5	Malaria	33.9	541.7	16.0
6	Helminth infections	12	66.8	5.6
7	Rheumatic	5.1	2.2	0.4
8	Kinetoplastids (Chagas, leishmaniasis and African trypanosomiasis)	4.1	139.2	34.0

Source: I sourced the data for this table from: Health Policy Division (2009). G-Finder: Neglected disease research and development: New times, new trends. The George Institute for International Health: Sydney, Australia. Available at: http:www.georgeinstitute.org/monitoring-global-rd-investment-neglected-diseases

aimed to benefit populations in High-Income countries, such as commercial investments in drugs or vaccines for Group I causes that target Western markets.

It is only when we compare this spending with what is spent on other disease groups that we get a real sense of how severely underfunded some neglected diseases are. Ischaemic heart disease and cerebrovascular disease are two examples of diseases that really do receive the lion's share of global funding. Together they accounted for 109 million DALYs globally in 2004[55] and from U.S. pharma and the NIH alone these two diseases received $8.4 billion in 2005 (42). This amounts to $77 per DALY, more than double the funding received by the top earner amongst neglected diseases, kinetoplastids ($34 per DALY). Ischaemic heart disease and cerebrovascular disease, which are listed at 4th and 5th in the leading causes of global disease burden, receive 77 times more funding than the leading cause of disease burden globally, lower respiratory infections ($1 per DALY).

In the following two sections I attempt to tease out just how much global funding goes to those diseases that are common health research priorities for South Africa and the region. I compare this to global funding for those diseases that are priorities only for Africa. For those health research priorities common to both, even if South Africa receives the lion's share of funding for these disease groups, other African populations have the potential to benefit indirectly from this funding because their health research priorities overlap.[56] Those disease groups that are research priorities for Africa but not for South Africa have the potential to both be underfunded in general through donor funding, but also do not stand to indirectly benefit from funding currently directed to South Africa.

[55] WHO Global Burden of Disease 2004 reports that Ischaemic heart disease accounts for 62.2 million DALYs globally and cerebrovascular disease accounts for 46.6 million DALYs globally. See WHO Burden of disease (2004) Part 4, p.43. Available at http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_part4.pdf

[56] This is of course contingent on whether the types of research will be relevant to other African populations, as discussed in Section 3.3 above.

3.3.3 Neglected developing world diseases that are shared as health research priorities by South Africa and Africa

Five of the eight leading neglected diseases of the developing world are shared established health research priorities for South Africa and the broader region. These include the bolded diseases in Table 3.10: lower respiratory infections, diarrhoeal diseases, HIV/AIDS, tuberculosis, and malaria. In section 3.3.1, I established that three of these diseases (HIV, tuberculosis, and malaria) are receiving relatively substantial funding, relative to the others. HIV receives $20 per DALY, tuberculosis receives $13 per DALY and malaria $16 per DALY. Lower respiratory infections and diarrhoeal diseases, are receiving disproportionately low health research investments compared to the others. Lower respiratory infections receive just $1 per DALY and diarrhoeal diseases $1.8 per DALY.

Table 3.10 Neglected diseases that are health research priorities for South Africa and Africa

Neglected disease	2004 DALYs (millions)	2008 Global funding (US$ millions)	$ per DALY
1 **Bacterial pneumonia** (lower respiratory infections)	**93.3**	**90.8**	**1.0**
2 **Diarrhoeal diseases**	**72.3**	**132.2**	**1.8**
3 **HIV/AIDS**	**57.8**	**1164.8**	**20.2**
4 **Tuberculosis**	**34.0**	**445.9**	**13.1**
5 **Malaria**	**33.9**	**541.7**	**16.0**
6 Helminth infections	12	66.8	5.6
7 Rheumatic	5.1	2.2	0.4
8 Kinetoplastids (Chagas, leishmaniasis and African trypanosomiasis)	4.1	139.2	34.0

If South Africa has equal duties to all the absolutely poor in the region, and if South Africa is receiving more than its fair share of resources for these shared priorities, then there are a number of ways in which South Africa can start to fulfil its duties. The first is to advocate and secure funding for more research into these two disease groups, an action that will benefit both its own population and that of the region.

Given the relatively low funding allocations to lower respiratory infections and diarrhoeal diseases, advocacy for increased international funding is needed. The second is to ensure that the funds it already receives for research into these diseases are used to conduct research that will benefit the region as a whole, and not only benefit South African citizens. In the case of malaria, South Africa has essentially prioritised research into a disease that for the most part only affects other Africans. Whatever the reasons for malaria's inclusion in South Africa's health research priorities, this might indicate that South Africa is already, to some extent, fulfilling its duty to the region.

3.3.4 Neglected developing world diseases that are health research priorities for Africa but not South Africa

Three of the eight leading neglected diseases of the developing world are health research priorities for the African region, but not for South Africa. These include the bolded diseases in Table 3.11: Helminth infections, rheumatic fever, and kinetoplastids. These are the class of neglected diseases that do not stand to benefit either directly or indirectly from any research that South Africa is already conducting. Also, because other African countries in general receive less donor funding than South Africa, these diseases have the potential for being generally underfunded. Kinetoplastids were identified earlier as the highest earners of research funds amongst neglected diseases of developing countries. Measured in dollars-per-DALY, this disease group receives more than HIV, tuberculosis, or malaria. But helminth infections and rheumatic fever receive very little funding. Measured in dollars-per-DALY, helminth infections and rheumatic fever combined receive less than one fifth the funding that kinetoplastids do.

Table 3.11 Neglected diseases that are health research priorities for Africa but not South Africa

Neglected disease	2004 DALYs (millions)	2008 Global funding (US$ millions)	$ per DALY
1 Bacterial pneumonia (lower respiratory infections)	93.3	90.8	1.0
2 Diarrhoeal diseases	72.3	132.2	1.8
3 HIV/AIDS	57.8	1164.8	20.2
4 Tuberculosis	34.0	445.9	13.1
5 Malaria	33.9	541.7	16.0
6 Helminth infections	**12**	**66.8**	**5.6**
7 Rheumatic	**5.1**	**2.2**	**0.4**
8 **Kinetoplastids** (Chagas, leishmaniasis and African trypanosomiasis)	**4.1**	**139.2**	**34.0**

If South Africa has equal duties to all the absolutely poor in the region, and if funding for these two disease groups (helminth infections and rheumatic fever) is very low relative to the others, then one way that South Africa could fulfil its duty is to advocate for international funding for these, or adopt them into their own research priorities. Another option would be for South African researchers to work with researchers in other African countries and apply for grants for research on neglected diseases—thereby using South Africa's greater research capacity to build capacity in other places.

3.4 How do global health research investments map onto the *types* of health research needed in low-income settings?

For two decades the imbalance in global health research spending commonly referred to as the 10/90-gap has been cited as justification for a need to change the current global health research paradigm. The focus of the discussion has been on *which disease groups* are receiving more or less funding globally. While there is still evidence of this gap, in which priority health research for particular *diseases* in low-

and middle-income countries is underfunded, the imbalance in research spending is not as simple as that. Beyond the rhetoric of the 10/90-gap, which points to *which disease groups* ought to receive more or less research funding, is a more specific question of what *types of research* ought to be funded within these disease groups in order to address the unique health research priorities of lower-income populations. Even if health research into diseases that affect low-income countries is being funded, it does not automatically follow that the fruits of that research will benefit low-income countries. This is because it does not follow that the *type* of research being funded is suitable to low-income country needs. For many of the diseases that predominantly affect low-income countries, successful interventions and products already exist and are readily available in higher-income settings. In many of these cases, the *types* of research that are most needed are implementation research on how to successfully integrate these existing interventions into low-income country settings, health systems research to ensure successful integration and scale-up of interventions into a country's health infrastructure, and in some cases research to develop similar products that suit local contexts (45, 46).

Knowing what types of research are needed to address the health priorities of low-income populations provides an evidence base from which health research funders can focus their resources. A research agenda that reflects the specific types of health research needed in low-income populations, rather than merely noting which disease groups need research, can inform an effective global research effort on diseases of poverty. Relevant to this thesis, knowing that different types of research are needed in the poorest populations informs how South Africa should fulfil its previously established duty to the absolutely poor in the region. If South Africa has equal duties to the absolutely poor in sub-Saharan Africa, and if global spending on health research does not reflect the *type* of research needed in Africa, then one way in which South Africa may be able to instantiate its duty is to advocate for, or fund a shift to, the specific types of research needed to address diseases affecting the absolutely poor in sub-Saharan Africa.

3.4.1 Low-income countries need different types of research than high-income countries for the same disease groups

Health research activities go far beyond the well-known areas of developing new products such as medicines, treatments and technologies. Health research also includes research aimed at strengthening weak health systems struggling to effectively provide health care to populations in need, as well as research to test the implementation of existing products or interventions. Product research and development is of course essential for health and includes drugs, vaccines, diagnostics, microbicides, vector-control products[57] and platform technologies[58] that can be potentially applied to a range of disease areas. New tools and interventions are however not enough to tackle disease, particularly in low-income settings, where there is a growing gap between the availability of tools, products and knowledge about disease and what is actually done to make use of these in disease-endemic settings.

Despite an increased global investment in diseases that affect low-income countries over the last two decades, there is still an alarming gap between innovations in health, such as vaccines, drugs and interventions, and their delivery to these poorer populations who need them most. Scientific advances in Group I diseases have enabled prevention, treatment, and in some instances eradication of certain diseases in high-income countries. Unfortunately, many of these innovations have yet to reach the places where they could have the largest impact on health. As an example, a pneumococcal vaccine able to dramatically reduce the number of children dying was approved in the US in the year 2000. Ten years later the vaccine remained expensive, was still marketed in a highly unfeasible form, and was still not available in most low-income countries where it could have made the biggest difference in reducing unnecessary death (55).

[57] Examples of vector control products include pesticides, biological control agents and vaccines targeting animal reservoirs.
[58] Examples of platform technologies include adjuvants, diagnostic platforms and delivery devices.

Many evidence-based innovations developed in high-income countries fail to produce results when transferred to lower-income settings. This is for the most part because their implementation has not been tested or they are unsuitable. Populations in low-income countries confront a plethora of social constraints and health threats that make the implementation of effective health prevention and treatment programs more difficult. People often have limited knowledge of preventive health practices and inadequate access to good quality healthcare. In addition, health is regularly undercut by other challenges such as inadequate water and sanitation infrastructure, high pathogen loads and socio-economic obstacles to behaviour change. In low-income countries health systems are also underfinanced and undermined by severe health worker shortages. A lack of both financial and human resources in the health sector implies a need to find ways to best use the limited resources available. For these reasons it is difficult to successfully adapt, implement and sustain new interventions in many low-income settings (56). To be effective, any new health-related products or interventions need to be usable within a given health system and implemented appropriately so that the end user is able to benefit from them.

In order for the funding invested into health research to reach its potential for improving health, low-income countries need three particular types of research. The first is research into *products* that can be used specifically in low-income settings. In some cases, products developed through health research in high-income countries can be used with relative ease in middle- and low-income country settings. However, in others, these products are inappropriate because they are unaffordable, inaccessible or unable to be used in a setting lacking the similar hi-tech infrastructure seen in higher-income contexts. Research is therefore needed to develop more affordable or less technology-dependent versions of the same product. One example of biotechnology research directed at health in low-income settings is research on modified molecular technologies. A PCR-based HIV test has been simplified to use filter paper to process and store blood samples. Samples stored in this way are heat-stable and can be used for many months. Simple hand-held test devices to diagnose malaria and HIV are

being researched for their adaptability to settings without running water, refrigeration or electricity (57).

The second and third are *implementation* research to ensure that already existing interventions can be effectively integrated into resource-poor health systems, and research to improve health systems themselves (58). Implementation research aims to develop strategies for effective health interventions in order to improve access to, and use of, these interventions (59). Health systems research focuses on the performance of a country's health services and interventions in the health sector. It can help identify best practices and prioritize areas that need strengthening. Implementation and health systems research are needed to establish the most efficient way of integrating successful products and interventions into a new and different environment. In many low- and middle-income countries, children under five years of age still account for a disproportionately large share of the disease burden. Communicable diseases such as lower respiratory infections, diarrhoeal diseases and perinatal conditions persist. These diseases can largely be prevented through relatively low-cost, already proven interventions. Therefore research into how best to implement these interventions in lower income countries has been advocated as a priority for global health research (58).

With the emergent double-burden of disease in low- and middle-income countries, cardiovascular disease, diabetes and depression are now also relevant to developing countries. Chronic diseases account for 60% of all deaths globally, and 80% of these deaths occur in low- and middle-income countries, where populations are disproportionately burdened during youth and middle age. Cost-effective preventive strategies and therapeutic approaches to reduce the burden of cardiovascular disease, diabetes and mental health disorders have been researched and developed in high-income countries. Vast knowledge is therefore already available on how to prevent and manage a major portion of these diseases, yet most countries, even within the high-income sector, do not implement that knowledge successfully. Much of this accumulated knowledge is likely to be relevant to low- and middle-income countries. However very few epidemiological studies have quantified the impact of major risk

factors for these chronic non-communicable diseases in low-income countries, and even fewer trials have been conducted to assess the efficacy of different intervention strategies. Implementation research to explore the transferability of these cost-effective interventions from high- to low-income settings is a priority (58). For example, cost-effective community-based antihypertensive and antidepressive treatments could have a profound effect in lower-income settings (58). Crucial implementation research that combines operations research and health services/systems research is also essential to ensure the success of rapid scaling-up of cost-effective interventions. Because of their multiple interacting causes and due to their chronic nature, non-communicable diseases challenge current paradigms of health care organisation and delivery. High-, middle- and low-income countries alike are struggling to find solutions at the levels of policy and health care delivery. The challenge is to close the gap between the existing evidence that supports proven interventions and the translation of this knowledge into policy and practice.

The specific types of research most needed in lower-income settings are the same across different causes of disease burden. Whether Group I or Group II diseases, low-income countries need research into *products* that can be used specifically in low-income settings, *implementation* research to ensure that already existing interventions can be effectively integrated into resource-poor health systems, and research to improve health systems themselves. Recommendations from the World Health Organisation, the Global Forum for Health Research and the International AIDS Society recommend that between 5% and 10% of development assistance should be directed towards implementation research to optimize interventions utilised and health outcomes achieved (60, 61). This indicates that governments and donors can spend relatively little money on this type of research and achieve large results.

3.4.2 Global spending on health research does not reflect the *types* of research needed in low-income countries

Low-income countries need different types of research than high-income countries. This applies even in the cases where the research is targeted at the same disease. As noted earlier in the chapter, high-income countries fund most health research globally. They also invest this funding predominantly in the causes of disease burden that affect high-income populations. Only a very small proportion of overall global spending on health research goes towards those diseases that predominantly affect populations in low-income settings. It might therefore be reasonable to assume that the types of research conducted by high-income countries are also those most suited to high-income population needs. This section examines to what extent the types of research conducted globally are those that would meet the health research needs of low-income settings. In the previous section I argued that low-income countries specifically need three types of research: 1) research into products that can be used specifically in low-income settings i.e. products that are more affordable, accessible, or less dependent on hi-tech infrastructure; 2) implementation research to ensure that already existing interventions can be successfully integrated into resource-poor health systems; and 3) research to improve health systems themselves (58).

Data on how much funding is directed at different types of research within any particular disease group is scant. In this section I report on the data that does exist to give some insight into the proportion of global health research funding that goes towards these specific research types. I then use a couple of specific disease examples to illustrate the distribution of funding invested into different types of research within and across disease types.

Products that can be used in low-income settings

The G-Finder reports on global investment into the research of new products targeted specifically at developing-country needs. The report excludes funding into disease areas that affect developing countries where the research constitutes commercial research and development, such as new HIV drugs and pneumonia vaccines targeting Western markets. The G-Finder is a great first step towards mapping the funding going towards products targeted specifically at the health research priorities for low-income settings. It provides valuable data on how health research funding is currently being allocated, not only by disease but also within a given disease. It gives an impression of how much funding is being directed specifically to the needs of lower-income settings, rather than a mere reporting of total global investments into a disease area, which would traditionally also include investments targeting Western markets. A cursory look at global investment into particular disease areas compared to investment targeted specifically at low-income country needs helps to illustrate just what proportion of global funding has the potential to meet the unique needs of these low-income settings. Again, since the U.S. is the major funder of global health research, and because the data on HIV research is accessible, I report here on U.S. funding for HIV research. Table 3.12 below shows U.S. funding directed specifically at low-income country HIV research as a proportion of total U.S. funding for HIV research.

Table 3.12 U.S. funding for HIV research specific to developing-country needs

U.S. funding for HIV research	US$ (millions)
Total funding (2005)	US$ 5000
Funding targeted at developing country research needs (2007)	US$ 858
Proportion targeted at developing country research needs	**17%**

Source: "Total funding (2005)" is the figure reported by Dorsey ER, Thomspson JP, Carrasco M, de Roulet J, Vitticore P, Nicholson S, et al. Financing of U.S. Biomedical Research and New Drug Approvals across Therapeutic Areas. PLoS ONE [serial on the Internet]. 2009 [cited 2009 May 2]; 4(9): Available from: http://www.plosone.org/article/info:doi%2F10.1371%2Fjournal.pone.0007015

"Funding targeted at developing country research needs (2007)" represents spending by U.S. National Institutes of Health (NIH), Bill and Melinda Gates Foundation, United States Agency for International Development (USAID), and aggregate pharmaceutical and Biotechnology Company respondents in the U.S. and globally. See p.17 of Moran M, Guzman J, Henderson K, Ropars A-L, McDonald A, McSherry L, et al. G-Finder: Global funding of innovation for neglected diseases 2009: Neglected disease research and development: New times, new trends. Sydney: The George Institute for International Health; 2009. Available from: http://www.policycures.org/projects.html

The NIH and U.S. pharmaceutical industry are the two largest funders of HIV research in the United States (42). Together they invested $5 billion in HIV/AIDS biomedical research in 2005 (42, p.3, Table 1). It does not however automatically follow that the products of this research will be relevant to the populations in lower-income countries that are most severely affected by HIV/AIDS. The G-Finder shows that in 2007 just over $850 million was invested by the U.S. in HIV/AIDS research specifically targeted at developing countries,[59] less than one fifth of total U.S. investments in research for this disease. Only a small percentage (17%) of total funding into a disease that affects predominantly low- and middle-income countries is actually spent on research and development needed in these countries. The majority of the funding, around $4 billion (83%), we can assume is directed to HIV/AIDS research targeted at high-income markets. Unfortunately, the G-Finder report does not provide an estimate of the total funding *needs* for product research in low-income

[59] This figure represents spending by U.S. National Institutes of Health (NIH), Bill and Melinda Gates Foundation, United States Agency for International Development (USAID), and aggregate pharmaceutical and Biotechnology Company respondents in the U.S. and globally. See p.17, Table 3 in Moran M, Guzman J, Henderson K, Ropars A-L, McDonald A, McSherry L, et al. G-Finder: Global funding of innovation for neglected diseases 2009: Neglected disease research and development: New times, new trends. Sydney: The George Institute for International Health; 2009. Available from: http://www.policycures.org/projects.html

settings and we therefore do not know the *extent* to which products for particular diseases are under-funded. G-finder also does not report on *how* funds should be disbursed, nor does it address the vital question of access to the products developed as a result of the research. The reality is that even if research does take place, access to the end products by those who need them the most is uncertain. This is because it depends largely on the pricing or registration policies pursued (55) and on whether implementation and scale-up within a health system is feasible.

Since low-income countries suffer a dual burden of disease, research into non-communicable diseases specifically targeted at low-income country needs is also necessary. Unfortunately, there are no data on the proportion of global funding devoted to non-communicable disease product research targeted at low-income country needs. A middle-income country, India, funded one example of an innovative non-communicable disease product that has the potential for a positive health impact in low-income settings. Phase 2 of the Indian Polycap Study assessed the safety of a combination pill containing a generic statin, an antihypertensive agent and aspirin. This product could have significant effects globally in lowering costs, enhancing adherence and improving control of multiple risk factors in cardiovascular disease. While this example surely demonstrates a positive move to product research specific to the needs of lower-income settings, it is not the norm.

Implementation and health systems research

Biomedical research has had impressive successes in the past because it has attracted substantial financial investment. The same is not true for the much-needed implementation and health systems research in low-income countries. Health systems research was recently referred to as the poor cousin of biomedical research, with just 0.02% of health spending in low- and middle-income countries invested in it (62).

A move to focus on implementation and health systems research, the specific types of research needed to address the unique needs of low-income countries, is a goal supported by the World Health Organisation's Special Program for Research and Training in Tropical Diseases (TDR) (63), COHRED (64), and the U.S. National Institutes of Health's initiative in Dissemination and Implementation Research in Health (65). The Global Symposium on Health Systems Research recently launched a platform for promoting implementation research by a new collaboration of several organisations. This marks a great first step in the push to fund implementation research in low-income settings (66). Seven countries were the first to receive funding through the platform and will each carry out a specific research project suited to the needs of their own population. However, programs like these need to be expanded.

The Global Fund, an organisation that funds research into HIV, tuberculosis and malaria (three disease groups for which the burden of disease in low-income countries is high, particularly in the African region) encourages the inclusion of operational and implementation research in programs it supports (59). In a recent review, they report that the proportion of the budget allocated to operational and implementation research over the total Global Fund portfolio for grants initiated in 2006 and 2007 is 1.3%. While this represents a three-fold increase on earlier rounds, where the proportion was 0.4%, it still falls far short of the 5-10% recommended by the WHO, The Global Forum for Health Research and the International AIDS Society (67). This data shows that while resources from organisations like the Global Fund encourage and enable researchers to conduct operational and implementation research, its potential is not being fully realised.[60] So while there are promising signs of increasing commitment to funding of operational and implementation research, this has not yet translated into serious capacity development initiatives for this research (68).

[60] Remme et al. (2010) provide welcome clarity on the distinct conceptual definitions of operational, implementation and health systems research. Although Korenromp et al (2007) refer only to operational research in their Global Fund report, based on their description of the types of research labelled as operational, these include both operational and implementation research according to Remme et al's definitions.

Malaria

In 2008 there were 250 million cases of malaria and nearly 1 million deaths globally, most of them in African children (69). In Africa, a child dies every 45 seconds of malaria; the disease accounts for 20% of all childhood deaths. Malaria can be prevented, diagnosed and treated with a combination of already existing and available tools and interventions. These include long-lasting insecticidal nets, indoor residual spraying, and intermittent preventive treatment for pregnant women to prevent malaria infection in high transmission settings. Vector control measures such as larviciding and environmental management are also used when appropriate. Medicines and diagnostics are used for case management. Malaria can be diagnosed by either microscopy or a rapid diagnostic test. Artemisinin-based combination therapies are the recommended treatment against *P. falciparum* malaria and chloroquine and primaquine are the treatments of choice for *P. vivax* malaria.

Following an aborted Global Malaria Eradication campaign in the 1950s to 1970s, malaria received little attention until recently. Over the past decade, there has been substantial progress in raising awareness about malaria, and several countries have achieved a substantial reduction in malaria-related morbidity and mortality. Following expanded coverage with long-lasting insecticidal nets and artemisinin-based combination therapies, malaria morbidity and mortality in health facilities in Rwanda was reduced by over 50%. The Roll Back Malaria Partnership recently developed the Global Malaria Action Plan, which outlines a global strategy towards a substantial and sustained reduction in the burden of malaria globally. Research into new tools and approaches to support global control and an eventual elimination effort forms an integral component of the plan. There is still a lot to do in order to achieve the Roll Back Malaria targets and extend the benefits to more countries. Country level capacity building and health systems strengthening will be critical to ensure that health systems can deliver the needed interventions to at-risk populations (70).

Three types of research are needed to support effective malaria control and elimination: 1) research and development of new tools; 2) research to inform policy; and 3) operational and implementation research. Research and development is needed to create new and improved anti-malarial interventions including drugs, vector-control tools, diagnostics and vaccines. Research to inform policy will define the types of interventions best suited for different contexts. Operational and implementation research is needed to understand the use and effectiveness of interventions in the field and improve the delivery and quality of interventions. GMAP estimates that about $750-900 million per year should be spent on product research. Funding for malaria research and development has increased over the past 5 years. In 2007 an estimated $422 million was invested. The two major donors (the U.S. NIH and the Bill and Melinda Gates Foundation) account for 40% of estimated funding for product research (i.e. $169 million). More than 60% of these funds are directed to drugs and vaccines (70). The G-Finder reports a similar amount of spending ($468 million) for malaria product research in 2007 (71). This spending is on products alone, and yet it still represents only around half of what Roll Back Malaria says is needed to stay on track. This does not include an estimate for spending on the needed policy, operational and implementation research.

There seem to be few data and little direction on what policy and operational research is being and should be funded. GMAP confirms that while consultative processes have been set in place to define the research agenda for new tools for malaria, a similar process is not yet underway for policy or implementation research (70). Implementation research is essential, however, particularly in low-income settings, to identify solutions to bottlenecks that limit program effectiveness in these contexts. Limited funding has made it difficult for implementation research to keep pace as new interventions for malaria have been scaled up resulting in current intervention field effectiveness being considerably lower than its potential. Non-adherence to drug regimens, improper use of long-lasting insecticidal nets and washing walls after indoor residual spraying are just some of the examples GMAP cites as causes of the lower effectiveness that need to be assessed.

The Global Fund provides resources to enable countries to conduct operational research, but opportunities are not yet fully utilised. While the Global Forum for Health Research, WHO, and the International AIDS society have advocated for 5-10% of development assistance funds to be dedicated to operational research, of the $400 million budget for malaria research grant proposals submitted to the Global Fund in 2007, just 2.75% ($11 million) was earmarked for operational research components (67). This is up from the 0.27% reported in the previous 5 funding cycles, but still falls short of the recommended 5-10%. Incidentally, malaria was the disease group with the highest percentage of the research budget allocated to operational research. The two other diseases reported on by the Global Fund, HIV and tuberculosis, had only 0.75% and 1.42% allocated to operational research. Over the total Global Fund portfolio, the budget allocated to operational research was 1.3% (67).

Malaria drug and vaccine research is booming, and after many decades there are now new anti-malarials in the pipeline. The onus now rests on donors and developing countries to research which of these new drugs offer the best cost-benefit for African populations. Research is also needed to ensure that these new drugs are appropriately absorbed by already strained health systems and delivered to end-users. Both NIAID and GMAP identify gaps in the current malaria research paradigm. NIAID lists implementation research as one of their four priority gaps in malaria research (72). GMAP notes that significant additional financial resources and human capacity are needed to address all of the operational and implementation research priorities for malaria (70).

Mental health

Since low-income countries suffer a dual burden of disease, research into noncommunicable diseases specifically targeted at low-income country needs is also

needed. Mental illness affects around 30% of the population globally. Two thirds of these cases receive no treatment. The proportion of people with mental disorders who are treated in low- and middle-income countries is even lower. These low treatment rates cannot be accounted for solely by scarcity of evidence from low- and middle-income countries. There is now solid evidence for the effectiveness of various forms of mental health treatment and prevention, especially for pharmacological and psychological interventions for depressive, anxiety disorders, and schizophrenia (73). These interventions have been shown to be affordable in low-income countries and are just as cost-effective as antiretroviral treatment for HIV/AIDS (74). Still the coverage of evidence-based services for people with mental illnesses is extremely low in most low- and middle-income countries (74). There is a relative paucity of trials that assess interventions to prevent and treat mental illness in lower-income settings, and especially of research to assess the effectiveness of scaling-up interventions. A recent priority setting exercise indicates that funding should concentrate on research to address this evidence gap. Specifically, research is needed to develop and assess interventions that do not need to be delivered by mental health professionals and to assess how health systems can effectively scale up feasible interventions (75). This however stands in contrast with trends in the allocation of most research funding. In 2006 the National Institutes of Mental Health (NIMH) allocated only 0.6% of its research funding to mental health research related to low- and middle-income country needs. It also stands in contrast with the listed priorities of organisations such as the NIMH whose main priority for research in mental health is the development of new interventions (76). New and highly efficacious drug treatments, to be effective, will still require well functioning health systems to deliver them and psychosocial interventions to accompany them. The bottom line is that without capacity building for mental health research in low- and middle-income countries, merely increasing research funding into mental health will be wasted.

While data on the proportion of global health research funding invested into the types of research most needed in lower-income settings is scant, the available data reveals that this proportion is generally very low. This is true for research into products

specifically targeted at low-income country research needs. It is also true for implementation and health systems research needed in low-income countries. In addition, it is true for both communicable and non-communicable diseases. The data shows that regardless of whether a particular disease group is a priority only for low-income countries or for both high- and low-income countries, global research investment does not necessarily mean that the fruits of that research will benefit low-income countries.

The question then is: How can global health programmes and organisations better appreciate and focus their activities and resources on the specific health research needs of low- and middle-income countries? The goal is ultimately to bring about more *efficient* approaches to combat diseases in contexts of poverty. Until now, far too few resources have been spent on research into what makes these systems tick. The data point to the urgent need for more implementation and health systems research, both for communicable and noncommunicable disease groups.

Knowing that these specific types of research are needed to address the health priorities of lower-income countries provides an evidence base from which health research funders globally can focus their resources on the specific health research needs of low-income countries. Relevant to this thesis, knowing that specific *types* of research are needed informs how South Africa should fulfil its previously established duty to the absolutely poor. If South Africa has a duty to the absolutely poor, and if global spending on health research does not reflect the *type* of research needed in low-income countries, then one way in which South Africa may be able to fulfil its duty might be to advocate for or fund a shift to the type of research needed to address diseases affecting the poor. This could include research into products that are targeted at low-income country populations as well as implementation and health systems research.

3.5 Conclusions: Spending does not correspond with global health research priorities

Scarce health research funding is a challenge for many countries, but is particularly acute in low-income countries, which have limited financial resources to fund necessary research themselves and a low priority given to their national health research needs by the global health research community. This chapter provided an overview of established health research priorities and presented data on the very skewed distribution of health research spending by different causes of disease burden and by different types of research. Mapping the distribution of funding for health research, both by different disease groups, and by the type of research funded within a given disease group, illustrates the degree to which global funding is still not aligned with established health research priorities. It also points to examples of gaps in funding by disease group and by type of research needed. Using data to identify the gaps in health research spending globally, and particularly the gaps in health research spending in low-income settings, provides an evidence base that guides South Africa in *how* to fulfil its duty to the absolutely poor. Before outlining some of the possible actions South Africa can undertake, it is worth noting that there is a need for more data on health research spending, particularly for those diseases and types of research most relevant to low-income settings.

3.5.1 More data on health research spending is needed

What became apparent when searching for data on health research priorities and on how much was being invested in health research was that in many cases this data has not yet been collected or reported. To my knowledge there has been no priority setting exercise conducted on a global scale for health research, and global health research priorities have therefore not been established. This in itself is telling of a general lack of alignment in global efforts relevant to health research planning, activities and resource allocation. A similar lack of globally compiled data is evident

when it comes to spending. In many cases, to illustrate a trend, I would assume that data on U.S. funding was a "good-enough" proxy for global investment. Since the U.S. continues to dominate global investments in health research, accounting for 50% of investments, trends in their spending are probably a "good-enough" proxy. At the least spending by the U.S. is a better proxy than spending by other countries; the second largest contributor after the U.S. is Japan at 10% (41, p.29). Reports on composite global health research spending in different disease categories would however be more informative.

While organisations such as the Global Forum for Health Research and G-Finder have continued to track where and on what health research resources are spent, there are important pieces of information that are not currently part of their general reporting. The first is an indication of how much *more* investment is needed for health research for specific diseases, particularly the diseases most prevalent in low-income settings. The second is data on spending for different *types* of research other than product research i.e. reporting on investments in implementation and health systems research.

My account of global justice offers a morally sound way of focusing resources, but at present there is not enough data to work out the details. This of course has implications for the certainty with which I can make recommendations. In many cases there is not comprehensive enough data to state with absolute certainty the amount of investment into a particular disease, or type of research relevant to that disease. The recommendations I make for how South Africa can begin to fulfil its duty then represent examples of the kinds of research or advocacy that South Africa ought to undertake. While the recommendations provided here are certainly not comprehensive, they do provide a starting point for South Africa's support of health research for the global poor.

3.5.2 A starting point: How South Africa might begin to fulfil its health research duties

At the start of this chapter I asked four separate but related questions:

1. How do global health research investments map onto global health research priorities?
2. How do South Africa's health research priorities compare with Africa's?
3. How do global investments in South Africa's health research priorities compare to global investments in Africa's health research priorities?
4. How do global health research investments map onto the *types* of health research needed in low-income settings?

In each case, the answer to the question points us to how South Africa's duty to the absolutely poor might be fulfilled. The first question asked how global health research investments map onto global health research priorities. Since there is not yet an established list of global health research priorities, disease burden was used as a proxy. From the data available to us, it is clear that global health research spending does *not* map onto global disease burden. Disease burden in high-income countries is different from disease burden globally. It is also different from disease burden in low-income countries. Most global health research (97%) is funded by high-income countries or sponsored by pharmaceutical companies linked to the industry of high-income countries. The majority of this spending goes towards health research to address causes of disease burden in high-income countries. Health research spending globally therefore maps onto disease burden in high-income countries. The burden of disease in low-income countries (particularly in Africa) is skewed to communicable diseases and global spending on health research is not adequately addressing these. Essentially, a gap in funding appropriate to global disease burden is still there. Although this gap may not be as large as it was when the 10/90-gap was reported in 1990, the majority of funding for health research globally remains directed at the causes of disease burden in high-income countries. Since South Africa has equal duties to all the world's absolutely poor, and global health research spending does not

map onto global disease burden, or onto the disease burden of the poor, then one way in which South Africa might begin to fulfil this duty is to advocate for a shift in global funding to the comparatively neglected burden of disease affecting the poor.

The second question asked how South Africa's health research priorities compare with Africa's. There are some diseases that are shared as health research priorities by both, for example, HIV, tuberculosis, respiratory infections and diarrhoeal diseases. There are other diseases that are research priorities for Africa but not South Africa, for example, malaria, sickle cell disease and the neglected tropical diseases. For those diseases that are priorities for both, we are not certain that the types of research being conducted by South Africa are relevant to the region. South Africa has equal duties to the absolutely poor within and beyond its borders, and it is morally permissible to focus this duty on the absolutely poor in Africa. South Africa should therefore commit to conducting types of research relevant both nationally and regionally on these overlapping health research priorities. For those diseases that are research priorities for Africa but not South Africa, it makes a difference if South Africa pursues only its own priorities or those more broadly relevant to the region. Since there are some diseases that are health research priorities for the region but not for South Africa, one way in which South Africa can begin to fulfil its duty is to incorporate these health research priorities into its own research agenda. This would entail an expanded research focus that is some combination of national and regional health research priorities. In the case of malaria, South Africa has prioritised research into a disease that for the most part only affects other Africans. This shows that South Africa is already to some extent fulfilling its duty to the region.

The third question asked how global investments in South Africa's health research priorities compare to global investments in Africa's health research priorities. Global spending on health research priorities reflects more spending in South Africa generally, more spending on the health research priorities shared by South Africa and the rest of the region, and less spending on the health research priorities unique to African countries outside of South Africa. Among those diseases that are shared as health research priorities by South Africa and Africa, lower respiratory infections and

diarrhoeal diseases are receiving disproportionately low health research investments compared to the others. While we do not have data on *how much* research on these conditions is needed, the Child Health and Nutrition Research Initiative advocate for research to improve understanding of how to efficiently and creatively delivery existing interventions in low-income settings. One way in which South Africa can begin to fulfil its duty to Africa's absolutely poor is to ensure that the funds it receives for research into this category of diseases, particularly lower respiratory infections and diarrhoeal diseases, are used to conduct research that will benefit not only its own population but also the region as a whole. South Africa should also advocate for increased global funding to address these particularly underfunded priorities, an action that will benefit both its own population and that of the region. Among those diseases that are health research priorities for Africa but not South Africa, helminth infections and rheumatic fever are receiving disproportionately low health research investments. In addition to incorporating these diseases into its own health research agenda, one way that South Africa could begin to fulfil its duty is to advocate for increased global funding into these two severely underfunded disease groups.

The final question asked how global health research investments map onto the specific *types* of health research needed in low-income settings. Of the lesser percentage of overall global health research spending that *is* going towards causes of disease burden in low-income countries, an even smaller proportion goes towards the types of research most needed in low-income settings. Both for products specifically targeted at low-income country research needs, and especially for implementation and health systems research, the proportion of global health research spending relevant to low-income settings is staggeringly low. So even though some health research is being conducted on the causes of disease burden predominantly affecting low-income countries, the fruits of that research will not necessarily benefit low-income countries. Not only does global spending fall short of global health research needs by disease group, but also within disease groups. Since global spending does not in fact reflect the type of research needed in low-income countries, one way in

which South Africa may be able to instantiate its duty to the absolutely poor is to advocate for or fund a shift to the types of health research needed to address diseases affecting these populations. This would include research into products specifically targeted at low-income country needs, implementation research and health systems research.

Degrees of impact on the health research budget

There are various actions that South Africa might take in order to fulfil its duties to the absolutely poor. Some of these will impact on South Africa's limited pot of research resources more than others. The action that would impact on South Africa's research budget the most would of course be the expansion of its research priorities to include those of the broader region. This would require redirecting some of its budget to diseases that it might not yet be investing in. It might be that South Africa could at least partly fulfil its duties without conducting the research itself, for example through directing grants or donor funding towards these diseases, by advocating for more research where appropriate, or disseminating its relevant research findings to other African researchers. South African researchers could additionally work with researchers in other African countries and apply for grants for research on diseases relevant to African priorities—thereby using South Africa's greater research capacity to build capacity in other places. These obligations are separate from those that require sharing the pot of health research resources. They would impact less on its own health research budget, but are still going to be necessary for research to happen. Deciding which of these actions to undertake will require careful consideration and is distinct from choosing to get out of the duty, which would be unacceptable.

4 The best way to treat a set of people fairly: Allocating limited resources for health research.

In this chapter I argue that in most cases investing in the worst-off is the fairest way to allocate scarce health research resources. In section 4.1, I outline three of the most commonly used, and widely affirmed, allocation principles: maximising overall health, increasing health equality, and prioritising the worst-off. I argue that in the case of allocating scarce resources for health *research*, prioritizing the worst-off is the best way to treat the global population fairly, most of the time, since it is also the best way to serve the other two principles most of the time. In section 4.2, I identify populations that are likely to be representative of the world's worst-off, as well as what types of health research, in which disease categories, are priorities for these populations. In section 4.3, I give an overview of global health research priority-setting exercises to draw out some of their central features and results. I analyse a selection of these exercises conducted by the World Health Organisation (WHO) over the last two decades. This analysis looks at the major disease areas and types of research recommended by the WHO to see whether they capture the priorities of the worst-off.

4.1 Prioritising the worst-off is the best way to treat a set of people fairly

The focus in this section is on how best to invest *limited* resources for health research. This is an attempt to find permissible ways to prioritise spending, when there are many more people who need help than can be helped. If not all health needs can be met, the chosen distribution of resources must at least be fair.

Principles to achieve a just allocation of scarce resources can be classified into three widely affirmed categories: maximising total benefits (the utilitarian principle), maximising equality (the egalitarian principle), and prioritising the worst-off (the prioritarian principle). Methods for allocating health resources are ways to put these principles into practice. Each of these principles recognises morally relevant values. I outline each briefly below.

When we aim to *maximize total health benefits* what is of primary moral importance is the total health of a given set of people irrespective of the distribution of health outcomes among the people. This criterion for allocating health resources tells us that we should allocate health resources in such a way that the total beneficial impact on health is as large as possible. If we apply health maximisation to the allocation of health resources generally, then health investments might simply look at DALYs[61] averted or QALYs[62] gained by various allocations of health interventions. Investors would choose the most cost-effective way to avert DALYs or gain QALYs. The obvious appeal of using this utilitarian principle is that it means producing the greatest health benefit that we can, given the limited resources available. One significant drawback however is that applying only this principle does not address how these health benefits are distributed. Sometimes, applying the utilitarian principle, the available resources could produce the greatest overall health benefit if they were spent helping people who are already well-off, which seems unfair.

The *principle of equality* requires treating people equally. There are two possible interpretations of this principle. The first is distributing an existing pot of health resources as equally as possible. Based on the principle that people are owed equal respect and that equality in resources is the best way to reach this ideal, this interpretation of the egalitarian principle says that every person should receive the

[61] The Disability-adjusted life year (DALY) is an indicator that measures the disease burden in a population. It is used as a single measure to quantify "loss of healthy years due to premature death and disability". One DALY represents one year lost of healthy life. The more DALYs reported for a given condition in any population, the worse the population is affected by that condition i.e. the higher the reported DALYs, the higher the disease burden.

[62] The Quality-adjusted life year (QALY) is an indicator that is used in the assessment of health interventions. It is used as a single measure to quantity the number of years of life, of a reasonable quality, a person might gain as a result of the

same level or bundle of resources so that people are treated equally by treating them the same. But the reality is that people do not start off equal with respect to health or welfare. Therefore I propose that a second interpretation is in fact the most plausible interpretation of this egalitarian principle. Applying the principle of equality entails that we should try to increase equality in health i.e. bring everyone to an equal level of health. On this interpretation, when we aim to *maximize health equality* the morally right action is that which produces the most equal distribution of health in a given population. One way to implement this interpretation of the egalitarian principle is to advocate for an equal chance for everyone to achieve a basic level of health.[63]

According to the principle of *investing in the worst-off,* the morally right action is considered to be that which offers the greatest advantage to the worst-off section of a population. A preference for the worst-off is commonly referred to as prioritarianism (77). The crucial issue for this principle is the severity of the condition of the worst-off. As long as it is feasible to improve the health of these individuals, resources would be directed to them, irrespective of the relinquished improvements for others who are better-off. Applying this principle will entail the provision of health on the basis of who is already badly-off, rather than on the basis of who would benefit the most (as in health maximisation). This principle is most plausible when the worst-off can be helped relatively easily. It does not work as well when investing in the worst-off would be a severe drain on resources, for example if one person requires continuous and extensive treatment for relatively little gain.

Each of these three principles may offer guidance on the allocation of limited resources for health. So, if we had a limited amount of money to invest in *global* health, what would be the fairest way to spend it? I argue that investing in the worst-off would be a just way of allocating these limited resources for health, *most* of the

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intervention. One QALY represents one year of perfect health lived. The more QALYs reported for a given medical intervention, the better the intervention.

[63] There are good reasons for moving from 'achieving overall health equality' to 'getting an equal chance for everyone to attain a basic level of health.' For example, some people will never get to a level of basic health and will become a black

time. This is because when distributing health resources, prioritizing the world's worst-off will also tend towards maximizing equality and maximizing total health benefits. In other words, in *most* cases investing in the worst-off is also the best way to serve both the egalitarian and utilitarian principles. I believe this is true for most investments in health *interventions* and for most investments in global health *research*. In the next section (section 4.1.1), I make this argument for investment in health *interventions*. In section 4.1.2, I make the same argument for investment in health *research*.

4.1.1 Allocating scarce resources for health interventions

If we apply the prioritarian principle, our goal is to direct our limited resources for health interventions to the world's worst-off. The concept of worst-off is in some respects a vague term. We might define those who are worst-off as those who are the sickest either now, in terms of illness severity, or over a lifetime. From the standpoint of justice, the most plausible conception of worst-off in this respect is a person's welfare over a lifetime i.e. their life trajectory, rather than the severity of their illness at a fixed point in time.[64] We might alternatively define those who are worst-off as those who are the poorest, even if their health is not necessarily the worst. While concepts like well-being, income-poverty and poor health are distinct, they are related. Health is an important component of overall well-being, and poor health is therefore an indicator of low welfare. Economic poverty, where a person lacks financial resources and is therefore unable to engage in economic transactions, is also generally an indicator of low welfare. Sen and Nussbaum call these components of well-being *capabilities*.[65] Following this approach, both poverty and poor health are

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hole of resources. For this reason, it is reasonable to assume that the best way to implement this principle is to advocate for an equal chance for everyone at having the same access to achieving a basic level of health.

[64] This is because everyone is worst-off right before they die.

[65] Sen and Naussbaum's capabilities approach to human well-being emphasises the multi-dimensional nature of a person's welfare. The emphasis is on human beings' having the capability to function in important ways if they so wish. This approach underscores the importance of the quality (or "well-ness") of the person's existence, determined by a set of interrelated elements such as adequate financial resources, education, adequate nutrition, good health, avoiding escapable

understood as forms of capability-deprivation. Those who are worst-off could be described as those who are lacking certain basic capabilities, or those lacking *the most* basic capabilities. Aggregate statistics for income (such as GDP per capita) and health (such as DALYs or QUALYs) are often used as indicators of a population's well-being. Those populations who are worst-off would therefore be those whose well-being, as indicated by measures of wealth and/or health, is the lowest of all populations. Whether we identify the global worst-off as those populations who are poorest, or as those populations who are sickest over a lifetime, we know that at least some populations in low-income countries would qualify.[66]

In *most* cases investing in health interventions for the worst-off i.e. serving the prioritarian principle, is also the best way to serve both the egalitarian and utilitarian principles. The goal of the utilitarian principle is to maximise total health gains. Applied to health interventions, this principle would support packages of interventions that attain the greatest health improvements for the most people at the lowest cost. Those populations that are worst-off generally suffer the greatest disease burden. Many of the health interventions most needed in these populations are also the most cost-effective compared to the health interventions needed in better-off populations. Health interventions targeted at these populations thus stand to produce the most health benefits overall. So applying the utilitarian principle, we should therefore often allocate scarce resources for health interventions to the worst-off, since this would produce a larger overall health benefit from an equivalent investment of resources.

This is best illustrated through examples of actual health interventions. The two leading causes of global disease burden are infectious diseases: lower respiratory infections and diarrhoeal diseases. They are also the leading causes of disease burden

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morbidity and premature mortality. These elements are constitutive of a person's being and any evaluation of wellbeing has to include an assessment of these constituent elements. See Sen (1992). Inequality re-examined. Harvard University Press: Cambridge.

[66] Some populations in the low-income category are the world's poorest. They also have the worst health in terms of absolute numbers of DALYs lost. One DALY represents one year of healthy life lost. It is used in burden of disease reports as a single measure to quantify the burden of diseases, injuries and risk factors. DALYs essentially combine years of life

in low-income countries. Treatment and prevention interventions for respiratory infections or diarrheal disease are cheap, simple and effective. Interventions to treat infectious diseases in general have been highly cost-effective in the past and remain so despite new challenges, such as drug-resistant pathogens and vectors. The Disease Control Priorities Project has shown that for respiratory infections, vaccination strategies can be cost-effective in lowering the disease burden (under $10 per DALY averted).[67] Case management may also be an efficient use of financial resources: treating non-severe pneumonia at health care facilities using a combination of oral antimicrobials and acetaminophen costs US$24 to US$424 per DALY averted (58, p.45). A more integrated approach to the management of many childhood illnesses, including respiratory infections and diarrheal disease, in a low-income setting such as sub-Saharan Africa costs approximately US$38 per DALY averted.[68] These intervention options represent examples of cost-effective approaches to improving overall health.

Just how cost-effective they are becomes apparent when we compare them to the cost-effectiveness of health interventions for cancer, one of the leading causes of disease burden in high-income countries to which currently a significant proportion of overall global investments in health interventions are made. Initial treatment for cancer in low- and middle-income countries is reported to cost between US$1,300 and US$6,200 per year of life saved. This is for the more treatable cancers of the cervix, breast, oral cavity, colon, and rectum. For the less treatable cancers of the liver, lung, stomach, and oesophagus, cost-effectiveness is even lower at between US$53,000 and US$163,000 per year of life saved (58, p.46). Thus, for the cost of *one year* of life saved, even for one of the more treatable cancers, we could avert

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lost due to death and equivalent years of life lost through being in a state of poor health or disability. The more DALYs reported for a given condition in any population, the worse the population is affected by that condition.

[67] This is the cost cited for national immunization programs, which have traditionally included vaccines against TB, diphtheria, tetanus, pertussis, poliomyelitis, and measles. See p.44 of Bloom BR, Michaud CM, La Montagne JR, Simonsen L. Chapter 4: Priorities for global research and development interventions. In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al., editors. Disease control priorities in developing countries. 2nd ed. Washington (DC): World Bank; 2006.

[68] This intervention package consists of exclusive breast-feeding; vitamin A and zinc supplementation; screening for immunization; and case management of pneumonia, malaria, and diarrhoea including oral rehydration therapy. See p.50 of Bloom et. al., (2006).

between 34 and 163 DALYs in a comprehensive intervention package for the management of childhood illnesses.[69] These reported cost-effectiveness analyses are for costs in developing countries. The costs for cancer treatment in a high-income country are higher. These examples are a few illustrations of the many investments in health interventions most needed in the worst-off populations, which are more cost-effective than health interventions most needed in populations who are better off. We could plausibly save hundreds, if not thousands of lives investing in child health interventions in sub-Saharan Africa for the same cost as if we were to invest in extending the life of one (or maybe a few) late-stage cancer patient(s) living in a high-income country such as the United States for a few years. If we follow the utilitarian goal of packages of interventions that attain the greatest health improvements for the most people at the lowest cost, then, in most cases, we should allocate scarce resources to the worst-off. This is because the worst-off typically suffer the greatest disease burden and one is required to invest relatively little compared with the outcome. The worst-off benefit more from an equivalent investment of resources.

Under the egalitarian principle, our goal is to produce the most equal distribution of global health. Life expectancy is a relatively good indicator of socio-economic development and is vital for understanding the health situation in a country (78). There are variations in life expectancy among social classes within countries (79). Globally, there are also variations in life expectancy by region and country. People living in low-income countries tend to have lower life expectancies than people living in middle- and high-income countries. Variation in life expectancy is an indicator for inequality in health. The most efficient way of closing the gap in global life expectancy (without levelling down) would be to save the people who are dying youngest i.e. those who have the lowest life expectancy. Allocating resources for

[69] One DALY is almost always worth more than one year of life saved. The data used in these examples comes from the DCPP, and some are reported as $ per DALY averted, while others are reported as $ per year of life saved. The difference in the measures used does not undermine the argument put forward here; in fact, it actually serves to strengthen it. In essence, 1 DALY could be considered more valuable than one year of life saved. The *year of life saved* measure fails to capture the morbidity and disability that are also important aims of health interventions. So one year of life saved might not

health interventions to the worst-off is likely to increase overall life expectancy within these populations. Equality overall would therefore be increased. Returning to the examples above, let us imagine that we have $100,000 to invest in increasing equality of life expectancy. An intervention package for the management of childhood illnesses in sub-Saharan Africa costs US$38 per DALY averted.[70] For $100,000 we could therefore, theoretically, avert 2632 DALYs. Initial treatment for the more treatable cancers[71] in low- and middle-income countries is reported to cost between US$1,300 and US$6,200 per year of life saved (58, p.46). For $100,000 we could therefore, at a maximum, save 77 years of life.[72] Treating childhood diseases is likely to increase overall life expectancy far more than treating cancers. The increase in life expectancy in children in the worst-off populations will have a greater impact on equality of life expectancy than if we were to devote the same monetary investment to extend the lives of a handful of better off, and generally older, cancer patients by a few years.

I have argued that investing in the worst-off for health interventions is the best way to treat a set of people fairly, most of the time, since in *most* cases, following this prioritarian principle is also the best way to promote or serve both the utilitarian and egalitarian principles. It results in maximising overall health and increasing equality in health.

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necessarily be one year of "healthy" life. The disparity in the cost-effectiveness analyses listed above therefore might be even greater than these numbers would initially suggest.

[70] This intervention package includes exclusive breast-feeding; vitamin A and zinc supplementation; screening for immunization; and case management of pneumonia, malaria, and diarrhoea, including oral rehydration therapy. See p.50 of Bloom BR, Michaud CM, La Montagne JR, Simonsen L. Chapter 4: Priorities for global research and development interventions. In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al., editors. Disease control priorities in developing countries. 2nd ed. Washington (DC): World Bank; 2006.

[71] Cancers of the cervix, breast, oral cavity, colon, and rectum.

[72] The data used in these examples comes from the DCPP, and some are reported as $ per DALY averted, while others are reported as $ per year of life saved. The difference in the measures used does not undermine the argument put forward here; in fact, it actually serves to strengthen it. In essence, 1 DALY could be considered more valuable than one year of life saved. The *year of life saved* measure fails to capture the morbidity and disability that are also important aims of health interventions. So one year of life saved might not necessarily be one year of "healthy" life. The disparity in the cost-effectiveness analyses listed above therefore might be even greater than these numbers would initially suggest.

4.1.2 Allocating scarce resources for health research

It is plausible to think that if investing in health *interventions* for the worst-off would be best, then investing in health *research* for the worst-off would also be best, since the objective of health research is to develop interventions that would enhance health and contribute to improved welfare.[73] Applying the prioritarian principle, where our goal is to prioritise the global worst-off, we would target our limited global health research investments towards research that is most needed in these worst-off populations. Since the purpose of health research is to develop or adapt interventions that would enhance health, and since in *most* cases investing in health interventions for the worst-off is also the best way to promote or serve both the utilitarian and egalitarian principles, focusing on the research needs of the world's poorest will likely also tend towards maximizing the total health benefits and increasing global health equality.

A possible objection to this line of reasoning is that many of the diseases that burden the worst-off populations already have existing cures and proven interventions. Since this is the case, further research is not needed in many of these disease groups. Returning once again to the example of childhood illnesses above, someone might argue that there are not only existing intervention packages for childhood illnesses, but also cost-effective intervention packages. Treating non-severe pneumonia at health care facilities using a combination of oral antimicrobials and acetaminophen costs US$24 to US$424 per DALY averted. The more integrated intervention package for childhood illnesses costs approximately US$38 per DALY averted (58, p.50). Both of these intervention options represent examples of cost-effective approaches to improving health in children in low-income settings. If we already have these cost-effective interventions for the very diseases that affect the worst-off, and if these interventions are available and in use in other parts of the world, then it is

[73] The difficulty here is to show that investments in research will actually have an impact on health. For the purposes of this chapter, I assume that research into a particular disease is liable to benefit people with that disease. Where there is data that deviates from that model, I will of course take this into consideration. Otherwise this assumption is warranted, since it is plausible that there is research, cost-effective and feasible, that will improve health in low-income settings.

not research that we need. We should instead direct this research funding elsewhere, to other disease categories.[74]

However, even though in some cases the first part of this statement is correct, it does not follow that because interventions exist and are in use in high-income countries, that these same interventions are successfully reaching and benefiting the worst-off populations that need them most. As evident from the priorities set by low-income countries, for example in Africa, there is in fact still a need for research into many of these disease areas. In particular, there are two types of research that are needed in low-income settings, even when there are successful interventions already available and in use in other parts of the world. The first is implementation and health systems research (56). These contribute to building the capacity of health systems themselves and enable effective uptake and scale-up of established interventions that we already know improve health elsewhere. For the world's poorest people, the benefits of these particular types of health research offer a potential for change that has gone largely untapped. Many who are poor lack access to basic health interventions that could save them from premature death and protect their ability to earn a living. However, in general not enough investment has gone into research to ensure successful implementation of these existing health interventions. We need more implementation and health systems research in low-income settings to improve the efficiency of available interventions. The second type of research needed for the global worst-off is research into products and technologies that have yet to be developed for use in low-income settings. These include lower cost medicines, diagnostics, delivery technologies and devices that would be more relevant to the specific disease conditions and economic environments of poor countries. These two types of research, which would enable poor populations in diverse contexts to apply solutions

[74] It is also possible that, sometimes, countries just lack the money to implement interventions that we are pretty certain would work. In these cases, what may be needed is aid. Alternatively, it might be that practitioners don't know about what they should do because the research findings didn't get to them. This WHO Bulletin details some of these issues: http://www.scielosp.org/scielo.php?pid=S0042-96862004001000005&script=sci_arttext. I acknowledge these possibilities. However my focus here is on the need for research, and there's a compelling case to be made for doing different kinds of research to address the problems in lower income countries. There may also be a compelling case for more aid to be distributed to lower-income countries, but assuming that countries have already made allocations between research and aid budgets that are justifiable, I am focusing on the allocations within research budgets.

that are already available elsewhere, are no less important than biomedical research, and are extremely valuable to improve the effectiveness of existing programs, optimise efficiency, and effectively transfer interventions from one setting to another. They are also in many cases cheaper or more cost-effective than biomedical research.[75]

Allocating scarce health research resources to more cost-effective health research produces a larger overall health benefit than an equivalent resource investment in less cost-effective research. Investing in the cost-effective health research most needed by the worst-off therefore maximises total benefit, promoting the principle of health maximisation. The types of health research needed in the world's worst-off populations are also targeted at those populations with the lowest life expectancies. As stated earlier, variation in life expectancy is a marker for inequality in health. Narrowing the gap in global life expectancies therefore increases global health equality. Allocating scarce health research resources to those with the lowest life expectancy is therefore the most efficient way of increasing global health equality. It follows that investing in the worst-off increases global health equality, promoting the equality principle. Successful implementation of the products of these two types of health *research* relevant to the worst-off would therefore be analogous to the successful implementation of health *interventions* for the worst-off. It would serve to maximise total health benefits and increase global health equality. Prioritising the worst-off is then surely the fairest way to allocate scarce health research resources, at least in most cases.

Ultimately, no principle is sufficient on its own to recognise all morally relevant considerations applied to *all* cases. There will invariably be a certain number of cases where not all the plausible principles for allocating resources coincide in their judgments i.e. in these cases, adhering to the prioritarian principle does not serve to maximise total health benefits and increase global health equality. One example is

[75] For example, the Global Fund encourages fund recipients to devote 5–10% of their budget to monitoring & evaluation (which may include implementation research).

that of "resource black holes," a situation in which no matter how many resources are invested into a particularly badly-off person or population, there is little to no improvement in health outcomes. In these cases the right way to allocate resources might involve limiting one's investment in the "resource black hole" so that other people also receive a share of the available resources. So while the argument in this chapter provides a principled commitment to assisting the worst-off, this commitment could be overridden when groups are especially expensive to assist. Investments should discriminate in favour of the worst-off who can be cheaply helped and thus against badly-off people whom it would be really expensive to help. This entails a willingness to, for example, prioritise the second-worst-off group over the worst-off group if the gains in overall health benefits would be much greater. However, these cases are rare; for the most part investing in the worst-off is the right way to allocate limited resources for health research.

4.2 Who are the worst-off?

In section 4.1, I argued that in most cases of scarce resource allocation for health *research*, prioritizing the worst-off is the fairest way to treat the global population, since it is also serves the other two principles. In this section I outline which populations are likely to be representative of the world's worst-off, as well as point to some of the health research priorities for these populations.

Defining exactly *who* are the global worst-off is complex. Those who are worst-off might be thought to be those who are poorest, or those whose health is the most severely affected. In some cases almost the whole population of a country might be neatly classified into the category of the world's worst-off. In other cases it might be only a segment of a country's population. This will be the case for many countries where there are distinct populations, some wealthy, some middle-income and some absolutely poor, such as India and South Africa. In section 4.1, I argued that directing our limited health research resources to populations in low-income countries would

be a way of adhering to the prioritarian principle. This is true whether we define the worst-off as those populations who are poorest, or as those populations who are sickest over a lifetime. At first glance it makes sense to think that the diseases affecting the worst-off might be fairly represented by the diseases affecting the category of low-income countries. I argue instead that the disease burden of the global worst-off is much more accurately represented by a smaller set of people than all those who live in low-income countries. This is because while the category of low-income countries would certainly include within it populations of people who are among the global worst-off, it is also likely to include other, better-off populations as well. Since this is the case, and since we want to focus our limited resources on the worst-off, it is helpful to delineate this narrower population representative of the worst-off.

In the following section, I attempt to delineate a group of people that we are certain are amongst the worst-off and that can therefore serve as a population representative of the global worst-off. In section 4.1, I located health as an important component of overall well-being and wealth as a key indicator of well-being. Given this, it is certainly true that those populations who are the poorest economically, *and* who have the poorest health indicators, are among the worst-off. There are a small number of countries, almost all in Africa, whose population almost exclusively consists of people in this category. Africa is home to 18 of the world's 20 poorest countries by GDP (80). Africa also bears the largest burden of disease and death in the world (Figure 4.1).

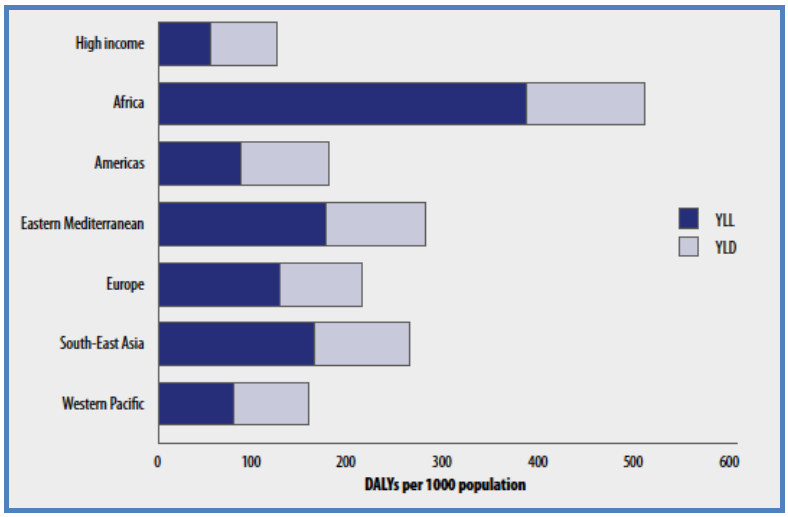

Figure 4.1 YLL, YLD and DALYs by region (2004)

Source: WHO Global Burden of Disease 2004 Update. Available at: www.who.int/healthinfo/global_burden_disease/2004_report.../en/ Figure 20: YLL, YLD and DALYs by region, 2004 p.41.

Note: DALYs for a disease or health condition are calculated as the sum of the Years of Life Lost (YLL) due to premature mortality in the population and the Years Lost due to Disability (YLD) for incident cases of the health condition

Table 4.2 provides a visual mapping of the world's economically poorest countries that also suffer the largest numbers of DALYs and deaths. The DALYs and death rates in all three categories in this table are extremely high by global standards. As a comparator, the US suffers <15 DALYs per 1000 population and <649 deaths per 100 000 population. When we map poverty against health indicators in this way, we see twelve African countries that are both amongst the twenty poorest countries by GDP *and* suffer the worst health as indicated by their significantly high DALYs and death rates.

Table 4.1 Mapping a population representative of the worst-off

Health Indicators	**>45** DALYs per 1000 pop AND **>1850** Deaths per 100 000 pop		**30-45** AND **1350-1850**	**20-29** AND **980-1350**
20 poorest countries by GDP	Burkina Faso Burundi CAR DRC Liberia Malawi Mali	Niger Rwanda Sierra Leone Uganda Zimbabwe	Ethiopia Guinea Madagascar Mozambique Togo Nepal Haiti	Eritrea
Better off populations (not among 20 poorest countries)	Afghanistan Angola Botswana Chad Cote d'Ivoire Equatorial guinea Guinea Bissau Iraq	Kenya (30-45 DALYs) Lesotho Nigeria Somalia South Africa Swaziland Tanzania Zambia	Benin Ghana Mauritania Namibia Sudan	Bangladesh

A population representative of the worst-off (12 countries with the poorest health *and* wealth)

Source: I sourced data for this table from: WHO. (2010). Age standardised death rates 2004. Available at: http://gamapserver.who.int/mapLibrary/Files/Maps/Global_asdeaths_2004.png; and McInTyre D, Stockdale C, Sauter B. The Twenty Poorest Nations in the World. 24/7 Wall St.; 2010 [cited 2010 October 12]; Available from: http://247wallst.com/2010/07/06/the-twenty-poorest-nations-in-the-world/

While the populations in these countries do not constitute all those who are worst-off, they are likely to be representative of worst-off populations. Mapping out the health issues most severely affecting this representation of the worst-off will allow us a clearer idea of the health issues unique to worst-off populations, and distinct from some of the health issues that affect other, better-off populations.

4.2.1 What is the disease burden of the worst-off?

In the following section, I use available data to broadly map out the major disease burden of the twelve countries identified in Table 4.2. I have labelled the composite data for these twelve countries "worst-off" - representing those who fall within the categories of both poorest health *and* poorest wealth. In each case, the reported

numbers for the category “worst-off” is an average of the data for the twelve countries combined (see Appendix B for detailed health statistics). The comparisons that follow give us an idea of the major disease players in this population.

Figure 4.2 below shows the distribution of years of life lost (YLL) by major cause of disease burden i.e. either by communicable diseases, non-communicable diseases or injuries. The years of life lost in high- and middle-income countries are dominated by non-communicable causes, with communicable diseases and injuries accounting for a much smaller proportion. The opposite is true for low-income countries where most years of life lost are due to communicable diseases (approximately 70%). The distribution of years of life lost in Africa, while more similar to low-income countries than to high- and middle-income countries, is still distinct from the distribution in low-income countries as a whole. Close to 80% of years of life lost are due to communicable diseases and only around 15% are due to noncommunicable; there is noticeably less noncommunicable disease burden in African countries than in the broader category of low-income countries. The distribution of causes in the worst-off is more similar to Africa’s distribution of causes than to that of any other group, including that of low-income countries. Communicable diseases dominate the landscape, accounting for 80% of the total years of life lost amongst the worst-off.

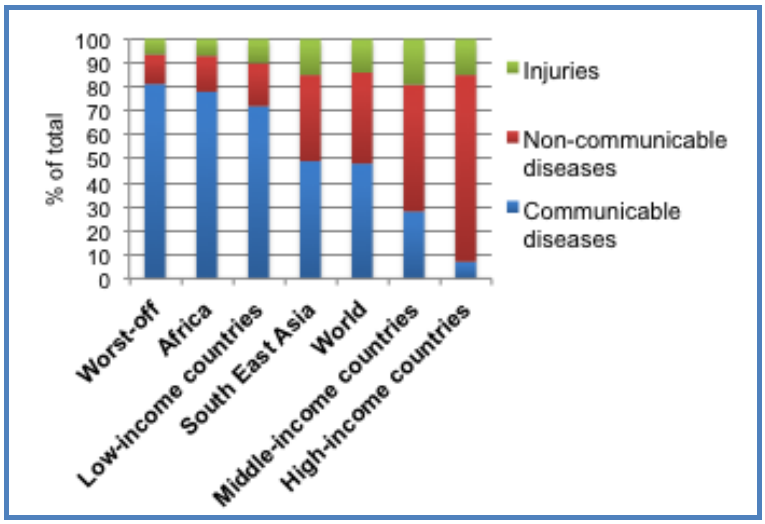

Figure 4.2 Distribution of years of life lost (YLL) by broader causes for selected regions and income groups (2008)

Source: I sourced data for this figure from: World Health Organisation (2011). World Health Statistics 2011: Distribution of years of life lost by broader causes (%) in 2008. WHO Press: Geneva. Available online: http://www.who.int/whosis/whostat/2011/en/index.html (pages 58-76). See Table in Appendix B for raw data.

In this analysis, the 12 countries representing the worst-off in the world are all African countries. One can imagine that the distribution of disease burden of the worst-off sub-populations in other parts of the world might be fairly distinct from the worst-off in the world. Since these 12 countries are all in Africa, we can anticipate that their disease burden is most similar to Africa's regional statistics. We might also anticipate that the worst-off populations in other parts of the world might have a somewhat different distribution than that of my selected sample. For example, close to 40% of the total years of life lost in the WHO's South East Asia region are due to noncommunicable diseases. Given this, it might be that the worst-off in South East Asia suffer a similar distribution of disease burden to South East Asia's regional statistics.[76] There is no data specifically for the worst-off subpopulation in South East

[76] This regional statistic might however be swayed by the large population of India, whose population (like South Africa's) is composed of a mix of worst-off, low-, middle- and high-income subpopulations. It is likely that large, better-off, subpopulations in larger countries like India pull the South East Asia regional statistics in one direction, to show a greater proportion of noncommunicable diseases. The worst-off in this region might therefore have a different distribution of disease burden than that of the regional South East Asia statistic.

Asia, but Bangladesh could serve as a good proxy for the worst-off in the region. Figure 4.3 maps the distribution of years of life lost for Bangladesh compared to selected regions and income-groups. Bangladesh's distribution of years of life lost (52% communicable, 34% noncommunicable, 14% injuries) is more similar to that of the regional distribution for South East Asia (49% communicable, 36% noncommunicable, 15% injuries) than to that of Africa's worst-off (81% communicable, 12% noncommunicable, 7% injuries).

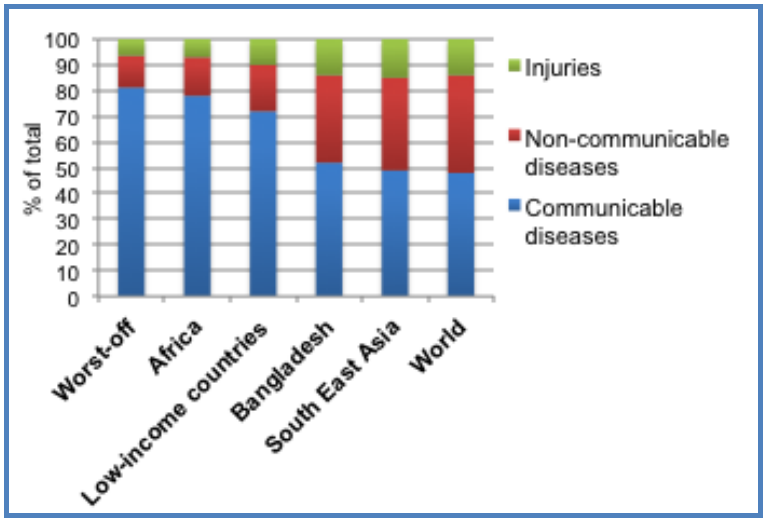

Figure 4.3 Distribution of years of life lost (YLL) by broader causes: Bangladesh compared to selected regions and income-groups (2008)

Source: I sourced data for this figure from: World Health Organisation (2011). World Health Statistics 2011: Distribution of years of life lost by broader causes (%) in 2008. WHO Press: Geneva. Available online: http://www.who.int/whosis/whostat/2011/en/index.html (pages 58-76). See Table in Appendix B for raw data.

Since there are still a significant proportion (52%) of years of life lost among the South East Asian worst-off due to communicable disease, it is worth comparing the communicable diseases suffered by the worst-off in this region with those suffered by the worst-off in Africa. Figure 4.4 shows adult mortality rates for selected communicable diseases and indicates similar tuberculosis mortality rates amongst the

worst-off in Africa (62 per 100 000) and South East Asia (51 per 100 000). Malaria and HIV mortality rates in South East Asia's worst-off are however negligible compared with the high rates in Africa.

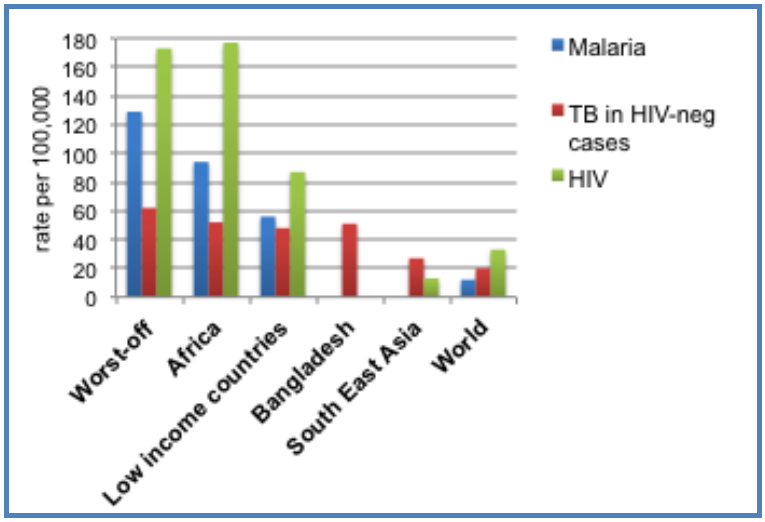

Figure 4.4 HIV, TB and Malaria mortality rates (per 100 000 population)

Source: Cause-specific mortality rate (per 100 000 population) in 2008 for Malaria, in 2009 for TB and HIV. World Health Organisation (2011). World Health Statistics 2011. WHO Press: Geneva. Available online: http://www.who.int/whosis/whostat/2011/en/index.html (pages 58-76). See Table in Appendix B for raw data.

Figure 4.5 shows the distribution of selected communicable causes of death in children under five years. Again, malaria and HIV, significant causes of death for children in Africa, are almost absent in Bangladesh, our proxy for South East Asia's worst-off. For the worst-off in both regions diarrhoea and pneumonia are significant contributors to under-five mortality.

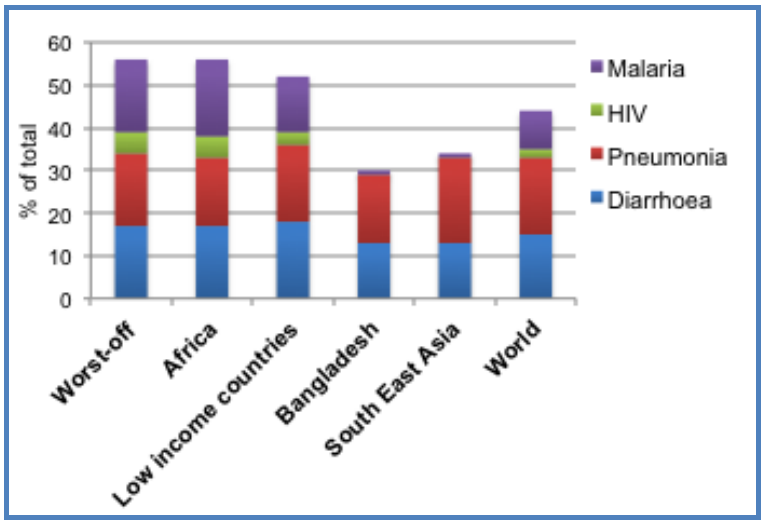

Figure 4.5 Distribution of selected causes of death among children <5yrs

Source: I sourced data for this figure from: World Health Organisation (2011). World Health Statistics 2011: Distribution of years of life lost by broader causes (%) in 2008. WHO Press: Geneva. Available online: http://www.who.int/whosis/whostat/2011/en/index.html (pages 58-76). See Table in Appendix B for raw data.

From the data presented above, two important observations are apparent:

1) The disease burden in Africa's worst-off is different from that of worst-off populations elsewhere, in this case South East Asia.

The most apparent difference is that the worst-off in South East Asia suffer a much higher proportion of noncommunicable disease than the worst-off in Africa, who are burdened predominantly by communicable diseases. The communicable disease category in South East Asia is still significant, and within this category there is some overlap with the disease burden of the worst-off in Africa. Pneumonia and diarrhoea are leading causes of death among children under five years for the worst-off in both regions and tuberculosis adult mortality rates are similar amongst the worst-off in both regions. The striking difference is that malaria and HIV, which heavily burden the worst-off in Africa, are negligible contributors to disease burden for South East Asia's worst-off.

2) The disease burden in Africa's and South East Asia's worst-off is different from the disease burden in the broader category of low-income countries

While it might be easy to assume that low-income country data is a good representation of the worst-off, the disease burden for low-income countries is a mix of those of the subpopulations within these countries. Some subpopulations are poorer and some are richer, and large sub-populations that are not amongst the worst-off skew the "low-income country" disease distribution to include diseases that are not those of the worst-off. While specific data for *all* disease groups is not available for Africa's worst-off, if we look at some of the data that *is* available, we can see that there is a distinction between what the worst-off are suffering from and what low-income countries are suffering from. The disease burden in Africa's worst-off is more similar to the disease burden for the African region than to the disease burden for the category of low-income countries. The disease burden for Bangladesh, our "worst-off" proxy for South East Asia, is also more similar to the disease burden for the South East Asian region than to the disease burden for low-income countries. This data suggests that the worst-off in Africa are not most accurately represented by the broad category of low-income countries, but rather are more accurately represented by the statistics available for Africa. Therefore, if South Africa or other nations want to focus resources on the worst-off in Africa, they will do better to focus resources on the regional health research priorities than on the priorities for low-income countries as a whole. Likewise, an entity that wants to focus on the worst-off in South Asia will do better to focus resources on the regional health research priorities for this region.

In chapter two I argued that South Africa is permitted to focus on the worst-off in Africa. For this reason, the rest of this section will focus exclusively on the worst-off in Africa. If we accept that the disease burden of Africa's worst-off is most similar to that of the African region, then in cases where there is not data available for the worst-off, African[77] data can be used as a more representative proxy than the broader

[77] Statistics for the WHO African Region include data from all the sub-Saharan African countries (except for Sudan, Djibouti and Somalia). In addition they include data from one country outside of sub-Saharan Africa, Algeria. The WHO

category of low-income countries.[78] The next section provides an overview of the distribution of death by different diseases in Africa, pointing to how this distribution is distinct from the distribution in low-income countries and mapping out which specific diseases are major players (measured in DALYs) in the African region. Since the data for Africa can be used as a reasonable proxy for the data on the worst-off in Africa I will from here on refer to "worst-off proxy" when describing these data.

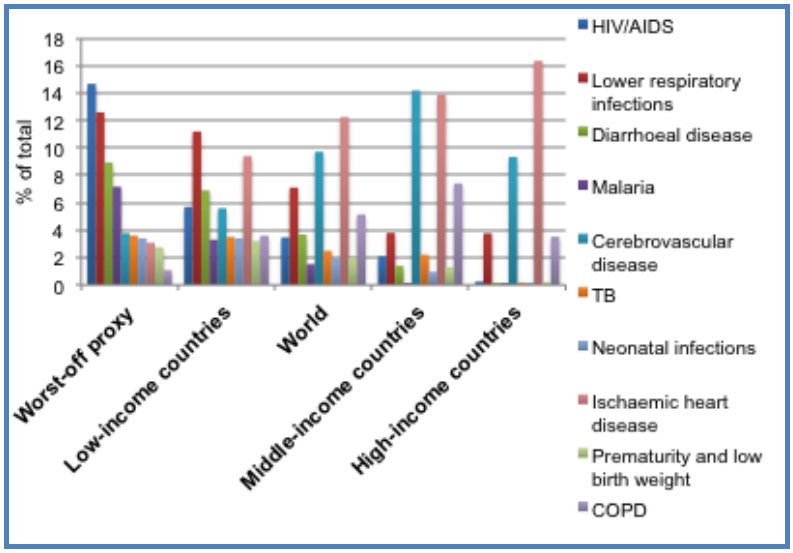

Figure 4.6 Distribution of death by specific diseases

Source: I sourced data for this graph from: WHO deaths LMIC by region 2004 http://apps.who.int/ghodata/?vid=100001; and WHO deaths by World Bank income group http://apps.who.int/ghodata/?vid=100001

When we look at the overall distribution of death by specific diseases, the worst-off predominantly die of infectious diseases. Figure 4.6 again confirms that the burden of disease in the worst-off is not the same as the burden of disease in low-income

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data for "Africa" essentially represents sub-Saharan Africa, rather than the broader African region. See Appendix A for a map and list of countries in the WHO African Region.

[78] The WHO Global Burden of Disease Report provides the most recent and detailed data on burden of disease by region and by income sector. They do not categorise the worst-off as an independent income sector, but they do in many cases provide data on the African region.

countries. There is certainly not the same proportion of non-communicable disease. In low-income countries the top four causes of death are lower respiratory infections, ischemic heart disease, diarrheal disease, and HIV. Cerebrovascular disease is a close fifth. This represents a mix of both infectious and non-communicable disease. However, in the worst-off the four top causes of death are *all* infectious diseases: HIV, lower respiratory infections, diarrheal disease and malaria. Non-communicable diseases do feature as causes of death in this population, but account for a very small proportion. The proportion of deaths from infectious diseases far exceeds that from non-communicable diseases.

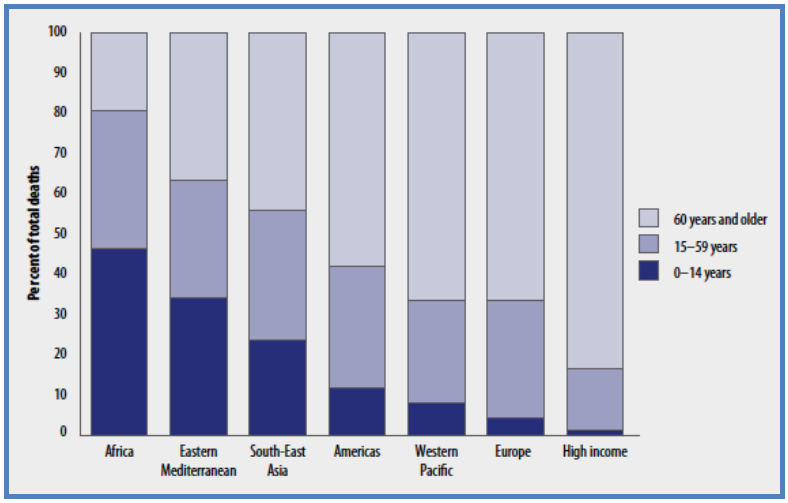

Figure 4.7 Distribution of age at death by region

Source: p.9 of World Health Organisation (2008). The Global Burden of Disease: 2004 update. Available online: http://www.who.int/healthinfo/global_burden_disease/2004_report_update/en/index.html

Figure 4.7 shows the distribution of death for different age groups by region. Over 80% of deaths in high-income countries are people aged 60 years and older, yet only 20% of deaths in the worst-off countries are people in the same age category. This is because in high-income countries death takes the old, but in the worst-off countries death takes the young. Almost 50% of deaths in the worst-off countries are children,

most of which are children under 5 years. This is a large proportion compared to high-income populations where close to 1% of all deaths are children. What is clear is that young children in the worst-off populations have a proportionally greater disease burden than any other age group. Dying as a child is worse than dying as an older person because dying as a child means losing more potential life. You are worse-off if you have fewer years of life than if you have more, so if a person lives to a relatively healthy 60 years and then falls ill, he or she is not one of the worst-off (81).

If we accept that dying as a child is worse than dying as an older person, and if 50% of the disease burden among the worst-off are children, then prioritising these diseases would certainly be in line with the prioritarian principle. Figure 4.7 shows the child mortality rate in Africa (our proxy for the worst-off) compared to other regions. Respiratory and diarrheal diseases constitute a significant proportion of child mortality in the worst-off. In fact, around 20% of the under-five mortality rate is from diarrhoea and another 20% is from pneumonia.[79] Malaria and perinatal deaths are also leading causes of death amongst children under 5 years.

[79] These percentages reflect the data in the table in Appendix C. This is aggregate data for the 12 countries representative of the worst-off. Data for this table was sourced from: World Health Organisation (2011). World Health Statistics 2011: Distribution of years of life lost by broader causes (%) in 2008. WHO Press: Geneva. Available online: http://www.who.int/whosis/whostat/2011/en/index.html (pages 58-76).

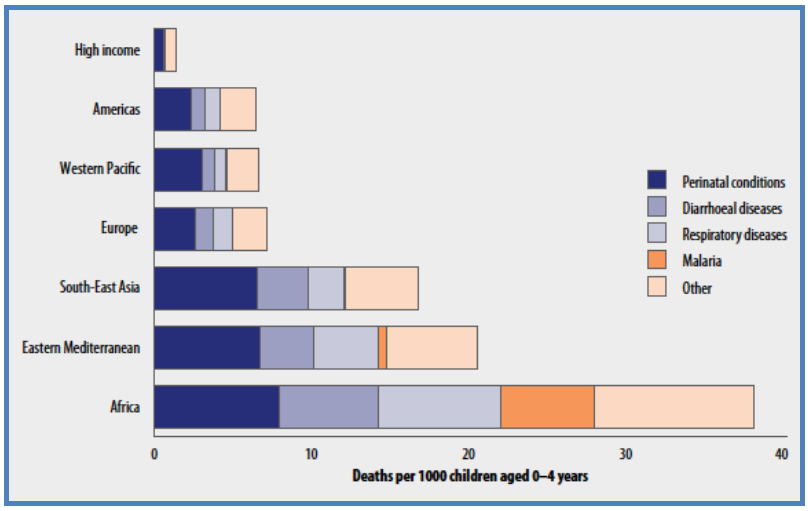

Figure 4.8 Child mortality rate by cause and region (2004)

Source: World Health Organisation, Health Statistics and Informatics Department (2004). Global Burden of Disease 2004 Update: Selected figures and tables. Available at: http://www.who.int/topics/global_burden_of_disease/en/

Deaths directly attributable to malaria occur almost entirely in the African region, representing 16% of all under-five deaths in the region. HIV and measles are also important causes of death in the "other" category. Pneumonia, diarrhoea, malaria and neonatal complications are easily avoidable causes of death in children.

4.2.2 What are the health research priorities of the worst-off?

Earlier in this section I stated that if we accept that the disease burden of the worst-off in Africa is most similar to the regional statistics for Africa, then in cases where there is not data available for the worst-off, African data can be used as a more representative proxy than data from the broader category of low-income countries. Here I assume that a similar line of argument applies to health research priorities. If we accept that the disease burden of the worst-off in Africa is most similar to that of Africa, then we might accept that the health research priorities of the worst-off in Africa are most similar to those for Africa. Then, since we do not have a list of health

research priorities for the worst-off in Africa, the health research priorities for Africa can be used as a more representative proxy than the health research priorities for the broader category of low-income countries.

In chapter 3 I reported that there has been one priority-setting exercise conducted for the African region. Table 4.3 shows the key domains for health research identified at a high-level ministerial meeting on health research in Africa in Abuja in 2006 (48). These key domains for health research are the only list of health research "priorities" available for the region. They are broadly aligned with the burden of disease in the region. Mapped against DALYs for the region, we can see that items one through three dominate the agenda. The top three health research priorities for the worst-off are infectious diseases, reproductive and sexual health, and child health.

Table 4.2 Priorities for health research mapped onto disease burden, Africa (2006)

	Key domains for health research in Africa	DALYs	% of total DALYs
1	Infectious diseases, including *malaria, tuberculosis, HIV and AIDS, emerging infections* and *neglected tropical diseases* (e.g. *African trypanosomiasis, Buruli ulcer, leishmaniasis and lymphatic filariasis)*	**177.5**	**47.1**
2	Reproductive and sexual health	**24.7**	**6.6**
3	Child health	**25.9**	**6.9**
4	Non-communicable diseases, including *cardiovascular disease, diabetes, cancers, sickle cell disease, injuries etc.*	15.6	4.1
5	Malnutrition	7.1	1.9
6	Mental health, including *drug and substance abuse*	5.7	1.5

Health research on non-communicable diseases is also listed but represents only 4% of the disease burden in the worst-off. This is significantly different from the broader category of low-income countries, where around 20% of disease burden is due to

non-communicable disease.[80] Low-income countries suffer a dual burden of disease and investment in non-communicable disease research that is specifically targeted at low-income country needs is important. However, if we were to have limited funds for health research and would like to direct these funds at research to benefit the worst-off, then non-communicable diseases may not be a top priority.[81]

4.2.3 What types of health research are most needed for the worst-off?

Table 4.3 gives us a good sense of the health research priorities for the worst-off by health area or disease category. We know, however, that even within a specific disease, the *types* of research needed in low-income settings might be different from the types of research being conducted in higher-income settings. For example, in chapter three I presented data to show that less than one fifth of total U.S. investments in HIV research were specifically targeted at developing country needs. So, only a small percentage (17%) of total funding into a disease that affects predominantly low- and middle-income countries is actually spent on the research and development needed in these low- and middle-income countries. The majority of the funding we can assume is directed to HIV/AIDS research targeted at high-income markets. This example illustrates that if health research is to truly meet the needs of the worst-off, it is not only important for global health research funding to be directed at particular diseases, but also at particular *types* of research related to those diseases.

In chapter three I argued that low-income countries specifically need three types of research: 1) research into products that can be used specifically in low-income settings i.e. products that are more affordable, accessible, or less dependent on hi-tech infrastructure; 2) implementation research to ensure that already existing interventions are successfully integrated into resource-poor health systems; and 3)

[80] See Figure 4.3 in the previous section.
[81] There will always be a trade-off between meeting current health research needs and generating future health benefits.

research to improve health systems themselves. Below I outline a few examples of the types of health research needed for some of the diseases most heavily burdening the worst-off. This is not a comprehensive overview or list of the health research that should be prioritized for this population, it merely demonstrates that there is evidence out there that could be used to ensure a better distribution of funding to the types of research that are needed the most in this population.

For the first category of product development, Kaplan and Laing (2004) articulate a useful set of distinctions for identifying pharmaceutical gaps in global research. Where there are pharmaceutical gaps, health interventions and treatments either *do not exist* (lack of basic scientific knowledge or limited market value/market failure) or *are inadequate* (lack of efficacy, safety concerns, or the delivery mechanism or formulation is not appropriate for the target group). Many of the health interventions most needed by the worst-off fall into the latter category. In some the biology of the disease is well understood but interventions have limited market value. Kaplan and Laing list malaria, tuberculosis, trypanosomiasis, and leishmaniasis in this category. In others the biology is complex *and* there is limited market value. Orphan diseases and some neglected diseases like Buruli ulcer are listed in this category.

For many of the diseases that predominantly affect the worst-off, successful interventions and products already exist and are readily available in high-income settings. However, these interventions do not reach the worst-off. Two of the more obvious examples are pneumonia and diarrheal diseases, the two biggest killers of children under 5 years old. Africa and South East Asia experience the highest burden of mortality due to pneumonia and diarrhoea, and, according to the World Health Statistics Report for 2011, include numerous countries that are not on track to achieve the Millennium Development Goal 4 target of reducing child mortality by two-thirds (82). This is not because there are no successful interventions available to combat these diseases; it is rather a result of inadequate coverage of crucial child health interventions against them. Oral rehydration therapy and zinc for diarrhoea, and case management with antibiotics for pneumonia are effective interventions. Most child deaths due to pneumonia and diarrhoea could be avoided if effective interventions

were implemented on a broad scale and reached the most vulnerable populations. The types of research that are most needed in these cases are implementation research on how to successfully integrate these existing interventions into local contexts, and health systems research to ensure successful integration and scale-up of interventions into a country's health infrastructure.

If we would like to prioritise the worst-off, then we should focus our resources on Group I causes. Effective interventions for many of these diseases exist and have successfully lowered the disease burden, and in some cases entirely eradicated these diseases, in many wealthier populations around the world. The health research most needed for these disease categories is implementation and health systems research on how to effectively implement existing interventions in the worst-off populations. To ensure that we successfully direct resources to the worst-off, the key here would be to adequately distinguish what proportion of global funding is directed towards these specific types of research needed in the worst-off populations, rather than merely look to the total amount of global spending directed at any particular disease group.

4.3 Applying the prioritarian principle to current methods of priority-setting

In section 4.1, I argued that the best way to treat a set of people fairly, most of the time, is to prioritise the worst-off. To determine whether global health research priority-setting methods are adhering to this prioritarian principle, we need to assess whether their recommended priorities for health research are aligned with the actual health research priorities of the worst-off. In section 4.2, I defined a population that is likely to be representative of the worst-off in Africa and identified some of the health research priorities relevant to this population. In this section I give an overview of global health research priority-setting exercises to illustrate that there are common processes and methods that have been used over time for setting health research priorities to capture some of their central features and results (section 4.3.1). I then

analyse a selection of the major exercises conducted by the World Health Organisation (WHO) over the last two decades (section 4.3.2). This analysis looks at the major disease areas and types of research recommended by the WHO to see whether they capture the priorities of the worst-off.

4.3.1 Methods for setting health research priorities

Scarce health research funding is a challenge for all countries, but is particularly acute in low- and middle-income countries, who have limited financial resources to fund necessary research themselves and a low priority given to their national health problems by the global research community. This dynamic has contributed to the striking contrast between the global distribution of sickness and death and the allocation of health research funding we see today. In an attempt to effectively utilize limited resources for health research and to guide both domestic and foreign research investments to the unmet needs of the world's most disadvantaged, several international organisations have conducted global health research priority-setting exercises. Since the late 1980's there have been several attempts by international organisations and other less formal groups to set global priorities for health research. Because it is considered essential to base health research resource-allocation decisions on a *rational* priority-setting process, many have focused on the development of methods for setting health research priorities (see Table 4.1 for a comparative overview of some of the major global health research priority-setting exercises. See Appendix B for a more detailed overview of each exercise).

Table 4.3 An overview of global health research priority-setting exercises

	ICHR[i] (1990)	COHRED[ii] (1993)	WHO Ad Hoc Committee[iii] (1996)	WHO Advisory Committee[iv] (1998)	WHO-IFPMA[v] (2001)	WHO Priority meds for Europe and the world[vi] (2004)	CHNRI[vii] (2006)	GFHR-3DCAM[viii] (2004/9)	TDR[ix] (1975-date)
Stated Aim	Guide domestic and foreign research investments to meet the needs of the most disadvantaged. Accelerate progress towards goal of equity in health.	Work towards equity in health and development.	Focus on strategic research on intervention development and evaluation (not fundamental research).	Reorient at least part of global health research towards global problem-solving and promotion of health development for the world's underprivileged.	Identify those infectious diseases most in need of new medicines or vaccines. Identify priority areas for additional research.	Address pharmaceutical gaps in Europe and the rest of the world.	Assess priorities within particular disease categories & conditions of importance in global child health. Promote health research that is not only limited to producing new knowledge, but also has a vision of implementation of this knowledge to reduce disease burden.	Make sure priority-setting in research benefits those with greatest need and contributes to improved health and equity.	Identify gaps in research that disproportionately affect low-income countries. Conduct research on neglected priority needs.
Priority-setting criteria	Problem significance Cost of intervention Likelihood of research success Who sets priorities for whom Time horizon for benefits	Magnitude and urgency of health problem Extent of previous research and potential contribution of research Feasibility of carrying out research Expected impact of research	Magnitude of problem Reasons why the problem persists Adequacy of current knowledge base Promise of research and cost-effectiveness analyses Adequacy of current level of effort	Scale and urgency of need Likelihood of success of research Availability of resources to do work Likely time scale Consequences of possible interventions likely to follow from research Existence of other options for interventions (outside the health sector)	Disease burden and future trends Existing interventions Medicines research and development priorities	Evidence based approach (burden of disease; efficacy of existing interventions) Projection or trend analysis methods Principles of social justice, social solidarity and equity (specifically for orphan diseases, Neglected diseases, diseases affecting vulnerable groups, and where there is market failure)	Likelihood that research option would be answerable ethically Likelihood that resulting intervention would be effective in reducing disease burden Deliverability, affordability and sustainability of resulting intervention Potential of intervention to reduce disease burden Effect of disease burden reduction on equity	Public health dimension (magnitude of health problem, determinants, level of knowledge) Institutional dimensions Equity dimension (yet to be fully defined but aim to elucidate correlates of poverty, powerlessness and social justice)	Not stated directly but broadly: Consensus-building process driven by disease endemic countries (DECs) Focus on areas not addressed by other partners Directed by MDGs Sustainability of research

	ICHR[i] (1990)	COHRED[ii] (1993)	WHO Ad Hoc Committee[iii] (1996)	WHO Advisory Committee[iv] (1998)	WHO-IFPMA[v] (2001)	WHO Priority meds for Europe and the world[vi] (2004)	CHNRI[vii] (2006)	GFHR-3DCAM[viii] (2004/9)	TDR[ix] (1975-date)
Results & Recommendations	General recommendations for high-income countries to commit a larger proportion of funding to low-income country health needs Recommended Essential National Health Research (ENHR)	Has supported multiple countries in setting research priorities	Research priorities: Childhood infectious diseases and poor perinatal and maternal health (recommend specific *types* of research, and packages of interventions) Microbial threats (TB, Pneumonia, Malaria and HIV) Cost-effective interventions for non-communicable diseases in low-income countries (Heart disease, mental illness, cancers, strokes, and COPD) Efficiency of health care systems	Highlights a number of "research imperatives and opportunities" – not attempt to provide ordered list of priorities. Acute respiratory infections (especially pneumonia) TB Measles Diarrhoea STDS and AIDS Tropical diseases – Malaria, Schistosomiasis, Onchocerciasis, Trypanosomiasis, Leishmaniasis (recommend operational research) Deadly disease outbreaks (Ebola etc) Noncommunicable diseases Cancer Cardiovascular diseases Other chronic diseases (The list goes on)	Research priorities: 1st tier: Malaria and TB 2nd tier: Trypanosomiasis, Chagas, Leishmaniasis, Lymphatic filariasis, Onco, Schistosomiasis (Pneumonia and diarrhoea - tools at hand therefore not recommend research)	Research priorities: Infections due to antibacterial resistance Pandemic influenza Smoking cessation Cardiovascular disease Diabetes Cancer Acute stroke HIV TB Neglected diseases and malaria (considered under "special group") Alzheimers Osteoarthritis COPD Alcohol use diseases Depression Postpartum haemorrhage	Research priorities: Pneumonia Diarrhoea Malaria Neonatal conditions Undernutrition HIV/AIDS		Research priorities: Chagas Dengue Helminths Trypanosomiasis Leishmaniasis Leprosy Lymphatic filariasis Malaria Onchocerciasis Schistosomiasis STIs TB/HIV coinfection TB

[i] International Commission on Health Research for Development (ICHR). See Commission on Health research for development. (1990). Health Research: Essential link to equity in development. Cambridge, MA: Oxford University Press.

[ii] Council on Health Research for Development (COHRED). What we do. Geneva: COHRED; 2011 [cited 2011 July 7]; Available from: http://www.cohred.org/what-we-do

[iii] Ad Hoc Committee on Health Research Relating to Future Intervention Options. Investing in health research and development Geneva: World Health Organisation; 1996 [cited 2009 October 12]. Available from: http://libdoc.who.int/hq/1996/TDR_Gen_96.1_pp1-34.pdf

[iv] Global Advisory Committee on Health Research (ACHR). A research policy agenda for science and technology to support global health development. Ulm, Germany: World Health Organisation; 1998

[v] The WHO-IFPMA Round Table was a joint task force comprising representatives of the World Health Organization (WHO) and the International Federation of Pharmaceutical Manufacturers Associations (IFPMA). The final results and recommendations were never published. For more information see: WHO-IFPMA Round Table. Working paper on priority infectious diseases requiring additional R&D. Geneva: World Health Organisation; 2001 [cited 2011 March 9]. Available from: http://www.who.int/intellectualproperty/documents/en/IFPMA.pdf

[vi] Kaplan W, Laing R. Priority medicines for Europe and the world. Geneva: World Health Organisation, Department of Essential Drugs and Medicines Policy; 2004 [cited 2011 September 28]. Available from: http://apps.who.int/medicinedocs/documents/s14208e/s14208e.pdf

[vii] Rudan I, Arifeen SE, Black RE. A systematic methodology for setting priorities in child health research investments. In: Huda TM, editor. A new approach for systematic priority setting in child health research investment. Geneva: Child Health and Nutrition Research Initiative (CHNRI); 2006

[viii] Global Forum for Health Research. The 3D combined approach matrix: An improved tool for setting priorities in research for health. Geneva: Global Forum for Health Research; 2009 [cited 2009 November 27]. Available from: www.globalforumhealth.org/content/download/.../CAM_3D_GB.pdf

[ix] WHO. TDR: For research on diseases of poverty. Special Programme for Research and Training in Tropical Diseases (TDR); 2010; Available from: http://www.who.int/tdr/about/en/

[x] Council on Health Research for Devepment (COHRED). Assessing National Health Research Systems. 2011 [cited 2011 February 26]; Available from: http://www.cohred.org/nhrs-assessment/

Table 4.1 compares the criteria for research priority-setting developed by these different groups, along with their aims, results and recommendations. What is apparent is that the criteria used by these different groups are similar. The common features and criteria of most of the tools and methods for priority-setting include: 1) estimates of health problems; 2) identification of gaps in the knowledge about ways to eliminate them and of research needed to control them; 3) the possibility of addressing the problem through research; 4) the feasibility and cost of the research; and 5) the potential outcome, impact and cost-effectiveness of interventions resulting from the research. These criteria for priority-setting make sense intuitively, and at least provide a framework for health research priority-setting on a global level. The question that remains is: Do the priorities recommended by each of these exercises point to a fair allocation of resources for global health research? If we accept that the fairest way to treat a set of people is to prioritise the worst-off, then in order to determine whether global health research priority-setting methods are pointing to a fair allocation of scarce resources involves determining whether they are adhering to this prioritarian principle.

4.3.2 Have WHO's global health research priority-setting exercises prioritised the worst-off?

A recent report by the World Health Organisation (WHO) offers an overview and analysis of a wide variety of WHO-led research priority-setting exercises since 2005. The majority of these exercises were undertaken with a view to identifying global health research priorities (83). The review reports that the use of an established priority-setting tool was rare and a need for more guidance on research prioritization was regularly expressed in discussions with WHO representatives. Additionally, the review reports a need, and an expressed demand by WHO staff conducting these exercises, for normative work in this area.

According to my account, if an organization's goal is to maximize global health benefit and increase global health equality, then it should prioritise the health

research needs of the worst-off. This prioritarian account offers normative guidance for the fairest allocation of scarce global health research resources. I have already pointed to some of the diseases affecting the worst-off (section 4.2.1) and, where data was available, to some of the health research priorities, and types of research, that have been recommended for these disease areas (sections 4.2.2 and 4.2.3). The health research priorities of the worst-off are likely most accurately represented by the health research priorities of Africa, rather than the health research priorities of the broader category of low-income countries. Having outlined what it is we *should* be researching in order to prioritise the worst-off, in the following section I assess the results of the major WHO global priority-setting exercises to see to what extent they captured these research priorities. Finally, I recommend that future exercises ought to focus on a more specific subset of research priorities in order to adhere to the prioritarian principle.

Over the past two decades the WHO has conducted a number of global health research priority-setting exercises, each an attempt to guide global health research towards the promotion of health development for the world's underprivileged. The first exercise was in 1996. The WHO Ad Hoc Committee conducted a global review of health needs and related research priorities in low- and middle-income countries. The committee explicitly stated that a central aim underlying the exercise was to explore systematic approaches to resource allocation in order to make the best use of limited funds. Their focus was on strategic research and on intervention development and evaluation, rather than fundamental research. The recommendations that came out of this priority-setting exercise included four priority areas: 1) childhood infectious disease and poor maternal and perinatal health; 2) continually changing microbial threats; 3) non-communicable disease and injuries; and 4) health care systems and policy.

The committee made detailed recommendations within each of the four categories, including recommendations for essential packages of cost-effective interventions for maternal and child health and the reallocation of funds for microbial threats from duplicated testing of therapeutics in the established market economies to the

development of affordable and cost-effective interventions in low-income settings. The committee also recommended implementation and health policy research to improve the efficiency of health care systems in low-income settings. While this exercise certainly captured some of the priorities of the worst-off, the scope of their recommendations extended beyond these priorities to include detailed research recommendations for noncommunicable diseases. The double burden of disease is a reality in low-income countries generally, but noncommunicable diseases do not feature as prominently in Africa. And since Africa's disease burden is a more accurate representation of the disease burden of the worst-off than that of low-income countries, it seems that the large scope of WHO's recommendations detracts from prioritising the worst-off in Africa. If we only have a limited pot of funds to distribute, and distributing those funds to prioritise the worst-off is the fairest way to treat the global population, most of the time, then the funds would be better spent invested more narrowly i.e. in those diseases and types of health research that are priorities for the worst-off.[82]

The second global health research priority-setting exercise led by the WHO was carried out by the WHO Advisory Committee in 1998. The committee's vision was one of global health, reviewing the problems of critical significance to health and suggesting ways of using research to contribute to their resolution. They explicitly stated that what was needed was a global strategy of concerted action to ensure that the required research initiatives were undertaken by the global research community. The committee set out to outline the range of research needed for global health development and to provide a strategy to mobilise the research community towards improving global health. The scope of recommendations for health research was therefore very broad, including: respiratory infections, tuberculosis, diarrhoea, sexually transmitted diseases, malaria and HIV, tropical diseases (including schistosomiasis, onchocerciasis, trypanosomiasis, and leishmaniasis), deadly disease outbreaks (e.g. Ebola), noncommunicable diseases, cancer, cardiovascular diseases,

[82] This is not to say that other types of health research and disease areas in low-income countries are not important. If we had a lot more money to distribute, then the relevant types of health research for communicable diseases would not be the

other chronic diseases (e.g. diabetes), other health impairments (e.g. blindness, hearing impairment, accidents, burns), oral health, and more. So while the recommendations did indeed capture some of the priorities of the worst-off, their recommendations were not *focused* on these, but rather included a plethora of research recommendations applicable to a large range of diseases.

The committee acknowledged that their review highlights a number of research opportunities rather than providing an ordered list of priorities. However, if the point of this exercise was to give direction to the international health research community, it might have been more useful to narrow this list to a set of priorities that can direct limited resources in the best way. Again it seems that the broad scope of WHO's recommendations detracts from prioritising the worst-off.

The third global priority-setting exercise led by the WHO focused exclusively on infectious diseases. In 2001, the WHO-IFPMA Working Group on medicines and R&D[83] convened to identify definitively those infectious diseases that are most in need of new medicines or vaccines, and to give some sense of the priority areas for *additional* research. The working group identified some infectious diseases e.g. HIV and sexually transmitted diseases, for which they judged that a substantial level of research was already underway. They also identified a contrasting group of diseases, namely malaria and tuberculosis, which in their view had scientifically tractable targets, but insufficient product research.

Further disease prioritisation revealed a second tier of neglected diseases requiring additional research, after malaria and tuberculosis. These included African trypanosomiasis, Chagas disease, leishmaniasis, lymphatic filariasis, onchocerciasis, and schistosomiasis. African trypanosomiasis, Chagas disease and leishmaniasis were identified as those most in need of new research since the existing treatments mostly needed multiple administrations, had multiple side-effects and were becoming

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only thing we should invest resources in. Also, while this applies in the short term, it may change over time.

[83] WHO-IFPMA refers to the working group of the International Federation of Pharmaceutical Manufacturers and Associations (IFPMA) and the World Health Organisation (WHO).

increasingly compromised by acquired resistance. By contrast, the exercise suggested that further research is not needed on pneumonia and diarrhoea as tools are already at hand.

This exercise focused exclusively on infectious diseases, so was on target when it comes to the particular category of diseases most severely affecting the worst-off. However, its focus was on those diseases in need of new medicines or vaccines and so it excluded from the outset particular types of research needed in worst-off populations, namely implementation and health systems research. Implementation and health systems research are two types of research needed in worst-off populations, particularly for diseases like pneumonia and diarrhoea where tools are already at hand but are not reaching the populations that most need them. This is then an additional area that should be focused on in future exercises of this kind.

This analysis of three of WHO's global health research priority-setting exercises reveals that recommended priorities match the disease burden of low-income countries. Since the health research priorities of the worst-off are narrower than those of low-income countries, these exercises recommend certain kinds of health research that are not priorities for the worst-off. This suggests that WHO ought to narrow the scope of their recommended health research priorities to more accurately reflect the health research needs of the worst-off. Similarly, governments with limited resources should also narrow their focus to that of the health research priorities of the worst-off. Following the guidance of these WHO priority-setting exercises will result in governments thinly spreading their limited health research resources across a range of disease areas, including some disease categories and types of research that are not relevant to the worst-off. If the best way to treat a population fairly is to invest in the worst-off, then governments with limited resources, who would like to treat their own population fairly, ought to focus their limited health research resources on the health research priorities of the worst-off.

5 Conclusions

This thesis provides the first account of the duties middle-income countries have to the global poor. More specifically, it establishes South Africa's duty to support *health research* for the global poor. In this concluding chapter, first I summarise my account of middle-income country duties to the global poor. Second, I review South Africa's existing health research priorities to examine whether South Africa might already be fulfilling its duties in some ways on my account. Third, I recommend "next steps" for South Africa. Finally, I offer suggestions for data collection, recommendations for future global health research priority setting, and insights on the duties of middle-income countries more generally.

5.1 South Africa's duty to support health research for the global poor

In chapter two, I explored whether South Africa only has duties to the poor within its borders or whether it also has duties to the poor beyond. Many theories of global justice accept that very rich countries have some obligation to those who are poor. South Africa, and countries like it, occupy a unique position that has been neglected in the global justice literature. A middle-income country might have significantly more resources and research capacity than low-income countries, but still struggle to meet internal needs that high-income countries have largely addressed. It is therefore not immediately apparent what the global justice duties of middle-income countries should be. I set out two questions that lie at the heart of determining South Africa's duties to the global poor. The first question, which I labelled the *general allocation question*, asked, "What is the best way to treat a set of people fairly?" I made the

assumption in chapter two that, in most cases, investing in the worst-off[84] is the fairest way to treat a set of people when allocating scarce health research resources, since, in most cases, adhering to this principle also serves to maximise total health benefits and increase global health equality. I defended this assumption in chapter four.

The second question, which I labelled the *global justice question*, asked, "Who counts from the standpoint of justice?" Addressing this question determined to which populations South Africa has duties, including those outside of its borders. I reviewed statism, nationalism and cosmopolitanism and presented their respective takes on how principles of global distributive justice ought to apply. I then set out what I believe is a plausible interpretation of each of their positions regarding how the limited resources of a middle-income country ought to be distributed. Each position delineates which set of people count, and therefore which set of people has a claim on South Africa's resources. Assuming that, in most cases, prioritising investment in the worst-off results in treating this set of people fairly, the absolutely poor within this set are then prioritised. Cosmopolitans recognise equal justice duties to the absolutely poor domestically and abroad. Moderate statists might also recognise equal justice duties to both. Strong statists and nationalists, however, insist that priority is given to the absolutely poor within the state or nation.

Reframing these different viewpoints as two separate questions clarified the scope of South Africa's duties. The first question is: Do political boundaries matter? The second: Do allegiances, such as national allegiances matter? I argued that, even if one is a strong statist or committed nationalist, there is reason to accept that when distributing limited resources to the absolutely poor, duties to foreigners are not weaker than duties domestically. Currently, when theorists draw a distinction between duties of justice and duties of humanity, they assume that duties of humanity

[84] The term "worst-off" is sometimes used as an indicator of relative deprivation. In this thesis, my reference to the worst-off is to the global worst-off. Since the global worst-off are absolutely poor, I do not use "worst-off" as a relative term. Those populations who are worst-off are those whose well-being, as indicated by measures of wealth and/or health, is the lowest of all populations. Since large sections of the populations of low-income countries survive with the bare minimum or less, reliance on an absolute rather than a relative measure of poverty is more relevant.

are weaker. The basic assumption is that duties of justice trump humanitarian duties. However, when we talk about the *absolutely* poor, or the world's worst-off, it could be argued that the relevant duty of humanity is the very specific duty to rescue. Those living in absolute poverty fall below some absolute standard of what a person should have in order to meet their basic needs. When it does not cause death, it still causes misery of a kind not often seen in rich nations. If this duty of humanity is in fact a duty to rescue those in absolute poverty, either to prevent death or merely allow the fulfilment of basic needs, then it is not clear that this duty of humanity is trumped by the duty of justice. I argued that the specific duty to rescue is so pressing that it trumps duties of justice and special duties to co-nationals, even if other more general duties of humanity do not. I concluded that both political boundaries and national allegiances are not morally important when determining whom, among the world's worst-off, counts. Political boundaries and national allegiances therefore cannot be used to prioritise the needs of some over those of others. Since the specific duty to rescue trumps both duties of justice and special duties to co-nationals, cosmopolitans, statists and nationalists alike should recognise equal claims to rescue, based on need, by all the world's absolutely poor. The effect of recognizing this rescue duty essentially brings the worst-off outside our political borders inside our scope of moral concern. As a result, South Africa has equal duties to the worst-off everywhere, both inside and outside of its borders.

Ultimately, a middle-income country cannot meet its duties to everyone who is amongst the world's worst-off. What is needed, then, is an ethically sound method for further prioritising the distribution of its limited resources within this population. I argue that a morally defensible way for South Africa to prioritise within this set is to prioritise the worst-off in sub-Saharan Africa over the worst-off elsewhere. This prioritisation of sub-Saharan Africans is not, however, based on political boundaries, nor is it based on regional allegiances. It is morally defensible for South Africa to prioritise the support of health research for sub-Saharan Africa because it will, in

most cases, produce a larger overall benefit. Therefore, although South Africa has equal obligations to *all* the world's worst-off, it is at least morally permissible for it to focus on the worst-off in sub-Saharan Africa. South Africa's duties to the worst-off in the region would be equal to its duties to its own citizens who are among the worst-off, and would be prioritised over duties to the worst-off elsewhere.

5.2 Is South Africa currently fulfilling its duty to support health research for the global poor?

In this section, I apply what I have argued in this thesis in order to determine to what degree South Africa is currently fulfilling its duty by my account. I briefly consider what South Africa's list of health research priorities would look like if generated by a more traditional statist account of justice. South Africa's currently documented priorities are clearly not set according to statist principles, or else malaria would not be included. I then review South Africa's currently documented health research priorities to see to what degree South Africa might already be fulfilling its duty to the region.

5.2.1 South Africa's health research priorities according to different accounts of justice

Setting priorities for health research is a way to legitimately decide where limited funding for health research ought to be directed. Health research priority setting exercises are traditionally conducted within the health ministry of a particular country, and are geared towards addressing the most pressing health needs of citizens. Thus they implicitly take a statist view of the country's obligations. If South Africa set its health research priorities according to this statist account, these priorities would reflect only the health research priorities of South African citizens. They would exclude research on diseases that do not affect South African citizens,

even if these diseases are very important for other Africans. Based on burden of disease estimates for South Africa, health research priorities generated according to statist principles would not include malaria, a disease that is not highly prevalent in South Africa. Since South Africa's currently documented health research priorities do include malaria, it is clear that they are not set solely according to statist principles (Table 5.1).

On my account, South Africa has equal duties to the worst-off both within *and* outside of its borders, but may prioritise the worst-off in sub-Saharan Africa. If South Africa set its health research priorities according to this account, there are two ways in which its priorities would be different from the current ones. The first is that the list would be narrowed to focus on the worst-off in the region. In chapter 4, I showed that infectious diseases, reproductive and sexual health, and child health dominate the disease burden of the worst-off and account for 60% of DALYs in the region. Given this, the list should be narrowed to prioritise these Group I causes. The second difference is that the list would be expanded to include health research that is a priority for other Africans, even if it is not a priority for South African citizens. For example, malaria, neglected tropical diseases and sickle cell disease would be priorities (Table 5.1).[85]

[85] For the sake of argument, and to illustrate how my account might be operationalized, this is a simplification. Determining which diseases are included in this duty-fulfilling list of health research priorities would require a regional health research priority-setting exercise. I discuss this in more detail in section 5.3.

Table 5.1 South Africa's health research priorities according to different accounts of justice

Statist account	Currently documented	My account
HIV and AIDS	HIV and AIDS	HIV and AIDS
Injuries	Injuries	~~Injuries~~
Tuberculosis	Tuberculosis	Tuberculosis
Diarrhoea	Diarrhoea	Diarrhoea
Perinatal and neonatal mortality	Perinatal and neonatal mortality	Perinatal and neonatal mortality
Nutrition	Nutrition	Nutrition
Common risk factors (Hypertension, smoking, overweight, alcohol etc.)	Common risk factors (Hypertension, smoking, overweight, alcohol etc.)	~~Common risk factors (Hypertension, smoking, overweight, alcohol etc.)~~
Cardiovascular diseases	Cardiovascular diseases	~~Cardiovascular diseases~~
Orphans and child-headed households	Orphans and child-headed households	Orphans and child-headed households
Maternal morbidity and mortality	Maternal morbidity and mortality	Maternal morbidity and mortality
Mental Health	Mental Health	~~Mental Health~~
Cancer	Cancer	~~Cancer~~
~~Malaria~~	Malaria	Malaria
Respiratory infections	Respiratory infections	Respiratory infections
Sexually Transmitted Infections	Sexually Transmitted Infections	Sexually Transmitted Infections
		Neglected tropical diseases
		Sickle cell disease

5.2.2 Doing a lot right: South Africa is already supporting health research relevant to the worst-off in the region

South Africa's currently documented health research priorities seem to reflect some intermediate version of priorities that might be established under each of these accounts (Table 5.1). These documented health research priorities, established during a series of Essential National Health Research meetings, include at least one of the diseases that are relevant to Africa but not South Africa, namely malaria (47). Based on prevalence alone, malaria would not be a health research priority for South Africa. So, why is South Africa already prioritising malaria research? Is it for self-interested

reasons or for so called other-regarding reasons, in this case, to support health research relevant to other Africans?

Since malaria in South Africa is primarily a border and population movement problem, some might argue that malaria is targeted as a form of national protection. It could be that South Africa's inclusion of malaria as a health research priority is merely a self-interested attempt to prevent malaria from entering the country. However, on my account there are also other good reasons for South Africa to support malaria research relevant to other African countries. Since South Africa has equal duties to all the worst-off in the region, and malaria is a priority for many African countries, on my account South Africa is at least partially fulfilling its duty to meet the claims of worst-off Africans.

South Africa is actively pursuing regional collaborations for malaria. *The Lubuntu Spatial Development Initiative* is a collaborative program between South Africa and bordering countries, Swaziland and Mozambique. Malaria control is a core component of this regional program. Perhaps more importantly, one of South Africa's National Malaria Policy's stated goals is "to progressively improve and strengthen district, provincial, national and southern African capabilities for malaria control" (84, p.4). Since the stated goal is to improve and strengthen *capabilities* in southern Africa, and not just to control malaria, we can assume that South Africa's reasons might go beyond those of self-interested protection. My argument would support South Africa in this endeavour.

South Africa is in fact doing a lot right. In its currently documented health research priorities, South Africa already includes the diseases of the worst-off in South Africa, which are also the diseases of the worst-off elsewhere in Africa. HIV, tuberculosis, diarrhoeal diseases and respiratory infections are examples of diseases that affect the worst-off in both South Africa and the broader region similarly. They are documented

national health research priorities for South Africa, and health research on these diseases is already underway.[86]

These actions are however not sufficient, on my account, for South Africa to fulfil its duty to the worst-off in the region. This is because South Africa has *equal* duties to *all* the worst-off in sub-Saharan Africa. If South Africa wants to fulfil these duties then other diseases that are priorities for the worst-off in Africa but not South Africa should be included in South Africa's list of health research priorities. At the very least, this expanded list ought to include the cluster of neglected tropical diseases and sickle cell disease.

I have not been able to identify a robust priority-setting process that has been carried out for the worst-off in the African region. It is beyond the scope of this thesis to conduct an empirical assessment of the research South Africa is currently conducting and determine fully whether South Africa is meeting the obligations identified herein. Instead, I propose that South Africa engage in a new priority-setting process to better meet its obligations to the global poor. In the following section, I suggest factors that ought to be considered in such a priority-setting exercise by a regionally concerned South Africa.

5.3 Next steps for South Africa: A regional health research priority setting exercise

Commonly accepted criteria for health research priority setting include: 1) estimates of the magnitude and urgency of the health problem; 2) the extent of previous research and identification of gaps in knowledge about ways to address the health

[86] There is a chance that South Africa's current research effort in these disease areas does not count towards fulfilling its duty to the worst-off in sub-Saharan Africa. This would only be true if the *type* of research South Africa is conducting is not likely to benefit the worst-off beyond its own borders. What would need to be assessed is whether the type of research being conducted is relevant to the needs of other countries in the African region or only to South Africa.

problem; 3) the possibility of addressing the problem through health research; 4) the feasibility and cost of the proposed health research; and 5) the potential outcome, impact and cost-effectiveness of interventions resulting from the proposed research (see Chapter 4). While these five principles provide a framework for health research priority setting nationally, they equally provide guidance on how to set health research priorities regionally or globally. Essentially, the scope of these principles depends on *who counts* from the standpoint of justice. A regionally concerned South Africa would need to adapt these criteria and apply them to a broader regional priority setting exercise.

In chapters three and four it became apparent that health statistics about the worst-off, as well as data on global investments in health research for the worst-off, are scarce. For many diseases, data has not yet been collected or reported, or has only been reported for a selection of countries or funders. In the following section, I summarise the data presented in chapters three and four. This data points to how South Africa might begin to fulfil its duties to the worst-off. What follows is by no means an exhaustive discussion of what ought to be considered in a regional priority-setting exercise. Rather, based on available data, I have selected three of the five commonly accepted criteria for health research priority-setting to develop illustrative examples of the next steps South Africa ought to take. The first is *the magnitude and urgency of the disease burden regionally.* The second is *the extent of previous global research into these health problems and the identification of gaps in knowledge* about ways to address them. This also includes a snapshot of the current global investment in these health problems, and a sense of which health problems are currently underfunded relative to others. The third is *the feasibility and cost of proposed research,* in this case limited by South Africa's capabilities.

5.3.1 Regional disease burden

In chapter four I outlined which disease categories are priorities for the worst-off in Africa. The top three health problems for the worst-off in Africa are: 1) infectious diseases, including malaria, tuberculosis, HIV and AIDS, emerging infections and neglected tropical diseases, such as African trypanosomiasis, Buruli ulcer, leishmaniasis and lymphatic filariasis; 2) reproductive and sexual health; and 3) child health. These three disease categories account for 60% of DALYs in the region (Table 5.2). A focus on research for these disease categories would then be a good starting point for South Africa.

Table 5.2 Priorities for health research mapped onto disease burden, Africa (2006)

	Key domains for health research in Africa	DALYs	% of total DALYs	
1	Infectious diseases, including *malaria, tuberculosis, HIV and AIDS, emerging infections* and *neglected tropical diseases* (e.g. *African trypanosomiasis, Buruli ulcer, leishmaniasis and lymphatic filariasis)*	**177.5**	**47.1**	60,6%
2	Reproductive and sexual health	**24.7**	**6.6**	
3	Child health	**25.9**	**6.9**	
4	Non-communicable diseases, including *cardiovascular disease, diabetes, cancers, sickle cell disease, injuries etc.*	15.6	4.1	
5	Malnutrition	7.1	1.9	
6	Mental health, including *drug and substance abuse*	5.7	1.5	

5.3.2 Regional health research and investment gaps

To correctly identify gaps where South Africa should pursue health research relevant to the worst-off in Africa will require empirical evidence. Data on investments in health research globally provide an indicator of where various funders are currently prioritising their investments, as well as where there are gaps. The G-Finder reports specifically on global investment into research for new products to prevent, diagnose

and manage the diseases of the developing world. The total reported funding for the 31 diseases identified by G-Finder constitutes 1.8 % of total global spending on health research.[87] South Africa would clearly be filling an important gap if they were to pursue health research relevant to developing countries, given the relatively low proportion of global funding being directed to it.

Since it is morally permissible for South Africa to prioritise the worst-off in sub-Saharan Africa, South Africa's duties may be narrowed to focus on the worst-off in this region. One way to further focus these resources would be to pursue health research relevant to the worst-off in sub-Saharan Africa that is relatively underfunded. In chapter three, I identified some of the diseases relevant to the global poor that are most underfunded. These diseases fall into one of two categories: 1) diseases that are shared as health problems by Africa and South Africa; and 2) diseases that are health problems in Africa but not in South Africa.

Health problems shared by South Africa and Africa

South Africa and Africa have many health problems in common, including many infectious diseases and maternal and perinatal conditions. Examples include HIV, tuberculosis, diarrhoeal disease and respiratory infections. For many of these shared health problems, South Africa is already conducting health research, some of which is likely to benefit other African populations. Benefit to other African populations is, of course, contingent on whether the *types* of research being conducted by South Africa are relevant to other African populations. Two of these diseases, HIV and tuberculosis, are receiving relatively substantial funding, relative to other neglected diseases. The other two, lower respiratory infections and diarrhoeal diseases, are

[87] See chapter 3, section 3.

receiving disproportionately low health research investments compared to the others (Table 5.3).

Therefore, to begin to fulfil its duty to the worst-off in the region, South Africa should ensure that the funds it already receives for research into these shared diseases are used to conduct research that will benefit all the worst-off in sub-Saharan Africa, and not only South African citizens. South Africa will need to assess to what extent its ongoing research is relevant to populations beyond its own borders. Since lower respiratory infections and diarrhoeal disease are receiving disproportionately low health research investments compared to the others, South Africa could advocate, and/or secure funding, for needed research into these two relatively underfunded disease groups, an action that will benefit the worst-off in its own population and the broader region.[88]

Health problems for Africa but not South Africa

Since South Africa has equal duties to all the worst-off in sub-Saharan Africa, it cannot only focus on the *shared* health research priorities that are in its national interest. This narrow focus would exclude many diseases that are significant health problems for the worst-off in the region. To meet the equal claims of sub-Saharan Africa's worst-off, it is necessary for South Africa to include sub-Saharan Africa's priority health problems, even if these are not priorities domestically. Examples of these diseases include malaria, sickle cell disease and the so-called neglected tropical diseases: Helminth infections, rheumatic fever, and kinetoplastids. These are the category of diseases that likely do not stand to benefit either directly or indirectly from any research that South Africa is already conducting. Also, because other African countries in general receive less donor funding than South Africa, these

[88] This will only follow if these disproportionately low health research investments represent serious gaps in the research needed for these diseases.

diseases have greater potential to be underfunded generally. Kinetoplastids were identified as the highest earners of research funds amongst neglected diseases of developing countries. Measured in dollars-per-DALY, this disease group receives more than HIV, tuberculosis, or malaria. But helminth infections and rheumatic fever receive very little funding. Measured in dollars-per-DALY, helminth infections and rheumatic fever combined receive less than one fifth the funding per DALY that kinetoplastids do (Table 5.3).

To begin to fulfil its duty to the worst-off in the region, South Africa should expand its own list of health research priorities to include those relevant to the worst-off in the region. Since helminth infections and rheumatic fever receive low health research investment compared to the others, South Africa could advocate, and/or secure funding, for these relatively underfunded diseases.[89] Additionally, South African researchers could work with researchers in other African countries and apply for grants for research on these diseases—thereby using South Africa's greater research capacity to build capacity in the region.

Table 5.3 Investments in the 8 leading neglected diseases in G-Finder

Neglected disease	DALYs 2004 (millions)	Global funding 2008 (millions)	$ per DALY
1 Bacterial pneumonia (lower respiratory infections)	93.3	90.8	**1.0**
2 Diarrhoeal diseases	72.3	132.2	**1.8**
3 HIV/AIDS	57.8	1164.8	**20.2**
4 Tuberculosis	34.0	445.9	**13.1**
5 Malaria	33.9	541.7	**16.0**
6 Helminth infections	12.0	66.8	**5.6**
7 Rheumatic	5.1	2.2	**0.4**
8 Kinetoplastids (Chagas, leishmaniasis and African trypanosomiasis)	4.1	139.2	**34.0**

Source: Data for table sourced from: Health Policy Division (2009). G-Finder: Neglected disease research and development: New times, new trends. The George Institute for International Health: Sydney, Australia. Available at: http:www.georgeinstitute.org/monitoring-global-rd-investment-neglected-diseases

[89] Again, this will only follow if these low health research investments represent serious gaps in the research needed for these diseases.

Types of research relevant to the region

It is perhaps easy to assume that, since many infectious diseases can be prevented, diagnosed and treated with a combination of already existing and available tools and interventions, there is no more research needed in these disease areas. In many cases, this is likely true. I showed in chapter 3, however, that even within a specific disease, the *types* of research needed in low-income settings might be different from the types of research being conducted in higher-income settings. For example, in chapter three I presented data to show that less than one fifth of total U.S. investments in HIV research were specifically targeted at developing country needs. So, only a small percentage (17%) of total funding into a disease that predominantly affects low- and middle-income countries is actually spent on research and development needed in these countries. The majority of the funding is directed to HIV/AIDS research targeted at high-income markets. This example illustrates that if health research is to truly meet the needs of the worst-off, it is not only important for global health research funding to be directed at particular diseases, but also at particular *types* of research within a particular disease. The proportion of global health research spending relevant to low-income settings is staggeringly low. So, even though there are investments in research for the diseases predominantly affecting the poor, the fruits of that research will not necessarily benefit the poor. This illustrates that not only does global spending fall short on global health research needs by disease group, but also within disease groups. Since global spending does not, in fact, reflect the types of research needed in low-income settings, one way in which South Africa may be able to instantiate its duty to the absolutely poor would be to advocate, and/or secure funding, for a shift to the types of health research needed to address diseases affecting these populations. In chapter four I outlined a few examples of the types of health research needed for some of the diseases most heavily burdening the worst-off. These include research into products specifically targeted at low-income country needs, implementation research and health systems research.

5.3.3 The feasibility and cost of research

I have argued that South Africa has equal duties to all the worst-off in sub-Saharan Africa. A likely objection to this position is that South Africa simply cannot fulfil this obligation. South Africa is a middle-income country and has a relatively limited amount of resources directed at health research. Also, South Africa's disease burden is four times larger than that of developed countries on average. This means we can reasonably expect a larger burden on finances, facilities and human resources in South Africa, compared to these same requirements in other countries. A plausible objection to my argument might go something like this: Given South Africa's relatively limited resources for health research, and the gravity of their own disease burden, the resources they can plausibly direct at health research for other Africans are not going to make a difference and South Africa therefore does not have this obligation.

There are various actions that South Africa might take in order to begin fulfilling its duty to support health research for the worst-off. In chapter three, I discussed how some of these would impact on South Africa's limited pot of research resources more than others. Expanding its health research focus to include some combination of both national and regional health research priorities would impact South Africa's research budget the most. This would require redirecting some of its budget to diseases that it might not yet be investing in, and that are not important for its own citizens. There are however many duty-fulfilling actions that South Africa can undertake that do not entail spending *their* limited health research resources. South Africa could at least partly fulfil its duties without paying for the needed research itself, for example, by directing grants or donor funding towards these diseases, by advocating for increased global investments where appropriate, or by disseminating its relevant research findings to researchers in other countries. South African researchers could additionally work with researchers in other African countries and apply for grants for research on neglected diseases—thereby using South Africa's greater research capacity to build capacity in other places. These actions are separate from those that require sharing the pot of health research resources. They would impact less directly

on South Africa's own health research budget, but are still going to be necessary for research to happen. Therefore, even given South Africa's relatively limited resources for health research, and the gravity of their own disease burden, the resources they can plausibly direct at health research for other Africans will make a difference and South Africa therefore does have this obligation.

When it comes to the limited pot of resources, it is morally permissible for South Africa to prioritise sub-Saharan Africa's worst-off. This does not, however, mean that South Africa ought to stop here. The entire world's worst-off have equal claims on South Africa. Since there are actions that South Africa can take that do not require sharing their pot of health research resources, South Africa can at least partly fulfil some of its duties to the global worst-off beyond the African region. In chapter three I reported on the distribution of global health research funding to give some insight into the proportion that goes towards diseases and types of research relevant to the poor. I identified gaps in health research spending, particularly gaps in health research spending relevant to the worst-off. Where the traditional big donors are not carrying out this needed research, there is room for South Africa to contribute towards filling these gaps.

My theory does not say how much South Africa should do, only that it has an obligation. However, it should be remembered that, on my account, the worst-off in sub-Saharan Africa, both within and beyond South Africa's borders, have an *equal* claim on South Africa's health research resources. Thus, South Africa would have to give a powerful argument to justify not pursuing research on the disease areas relevant to this population. Given what I have argued here, this duty cannot simply be ignored.

5.3.4 Next steps for South Africa

My account of global justice offers a way to focus health research resources, but at present there is not enough data to work out the details. This of course has

implications for the certainty with which I can make recommendations. In many cases there is not comprehensive data to state with absolute certainty the amount of investment into a particular disease, or type of research relevant to that disease. The recommendations I make for how South Africa can begin to fulfil its duty then represent examples of the kinds of research or advocacy that South Africa ought to undertake. While the recommendations provided here are certainly not comprehensive, they do provide a starting point for South Africa's support of health research for the global poor.

Table 5.5 Next steps for South Africa

Actions that a duty-fulfilling South Africa ought to undertake
For global health research
1. Advocate for a shift in global funding to the comparatively neglected burden of disease affecting the absolutely poor.
2. Advocate for a shift to the *type* of research needed to address diseases affecting the worst-off. This could include research into products that are targeted at low-income country research needs as well as implementation and health systems research so direly needed in these economic sectors.
For those disease that are shared health problems for South Africa and the region
3. Ensure that the funds it receives for research into these diseases are used to conduct research that will benefit not only the worst-off in its own population but also those in sub-Saharan Africa.
4. Commit to conducting the *type* of research relevant to both South Africa and the region on these overlapping health research priorities.
5. Specifically advocate and secure funding for the types of research that are the most underfunded. Examples in this category include diarrhoeal and respiratory infections.
6. Work with researchers in other African countries and apply for grants for research on these diseases—thereby using South Africa's greater research capacity to build capacity in other places.
For diseases that are health problems for Africa but not South Africa
7. Continue on-going malaria research.
8. Incorporate sub-Saharan Africa's established health research priorities into its own research agenda. This would entail a shift in its research focus to one that is some combination of national and regional health research priorities.
9. Specifically advocate and secure funding for the types of research that are the most underfunded. Examples include helminth infections and rheumatic fever.
10. Work with researchers in other African countries and apply for grants for research on these diseases—thereby using South Africa's greater research capacity to build capacity in other places.

Table 5.6 South Africa's health research priorities: a place to start

South Africa's health research priorities*
Diarrhoea
HIV and AIDS
Malaria
Maternal morbidity and mortality
Neglected tropical diseases
Nutrition
Orphans and child-headed households
Perinatal and neonatal mortality
Respiratory infections
Sexually Transmitted Infections
Sickle cell disease
Tuberculosis

* In alphabetical order

5.4 Implications

5.4.1 A narrowed focus for future global health research priority-setting

In chapter four I argued that, when distributing limited health research resources, the fairest way to treat a population, most of the time, is to prioritise the worst-off. In order to determine whether global health research priority-setting exercises have endorsed this fair allocation of scarce resources, I analysed a selection of WHO global priority-setting exercises to establish whether they adhered to this prioritarian principle.

The analysis revealed that the WHO generally recommended priorities that match the disease burden found in low-income countries. Since the health research priorities of the worst-off are different from those of low-income countries, these exercises recommended certain kinds of health research that are not priorities for the worst-off. Since the fairest way to allocate scarce resources, most of the time, is to prioritise the

health research needs of the worst-off, future global health research priority setting exercises ought to narrow the scope of their recommended health research priorities to more accurately reflect this.

Similarly, governments with limited resources are also encouraged to narrow their focus to that of the health research priorities of the worst-off. Following the current guidance of these WHO priority-setting exercises will result in governments thinly spreading their limited health research resources across a broad range of disease areas, including some disease categories and types of research that are not relevant to the worst-off. If the best way to treat a population fairly is to invest in the worst-off, then governments with limited resources who would like to treat their own population fairly ought to rather narrow the focus of their limited health research resources on the health research priorities of the worst-off.

5.4.2 Data is scarce, research is needed

When searching for data on health research priorities and funding, it became apparent that in many cases these data have not yet been collected or reported. To my knowledge, there has been no priority setting exercise conducted on a global scale for health research, and global health research priorities have therefore not been established. This in itself is telling of a general lack of alignment in global efforts relevant to health research planning, activities and resource allocation. A similar lack of globally compiled data is evident when it comes to spending. In many cases, to illustrate a trend, I would assume that data on U.S. funding was a "good-enough" proxy for global investment. Reports on composite global health research spending in different disease categories would, however, be more informative.

While organisations such as the Global Forum for Health Research and G-Finder have continued to track where and on what health research resources are spent, there are important pieces of information that are not currently part of their reporting. The first is an indication of how much *more* investment is needed for health research for

specific diseases, particularly the diseases most prevalent in low-income settings. The second is data on spending for *types* of research other than product research, such as reporting on investments in implementation and health systems research.

5.4.3 The duties of middle-income countries

The global justice literature has been silent on the duties of middle-income countries towards the global poor. Middle-income countries have limited resources and a section of their own population still living in absolute poverty. Thus, unlike very rich countries, they do not have the means to assist everyone in need. In this thesis I explored whether South Africa has duties to the global poor. More specifically, the central question of this thesis was whether South Africa has a duty to support *health research* for the global poor.[90] I addressed the question of how a resource distributor (in this case a South African health ministry) should distribute its limited pool of resources for health research.

While the focus of this thesis has been on South Africa, the conclusions I draw are relevant for any resource distributor (or government department) tasked with allocating a limited pool of resources for health research. Other middle-income countries, such as Thailand, India, China, and Brazil, have the same health research duties to the global poor. All the world's worst-off have an equal claim on middle-income country health research resources. Given that middle-income countries, with limited resources, are not able to assist everyone in absolute poverty, it will be necessary to find morally defensible ways to prioritise within this set. It might be that prioritising the worst-off in their region is morally permissible, because, similar to the

[90] The difficulty here is to show that investments in health research will actually have an impact on welfare. Like Sen and Nussbaum, I believe that health is an important component of overall well-being, and Sen and Nussbaum call components of well-being capabilities. Following this approach, poor health is understood as a form of capability-deprivation. Those who have poor health could then be described as those who are lacking a certain basic capability, which negatively affects their well-being. Poor health is therefore an indicator of low welfare. Since the very purpose of health research is to develop or adapt interventions that would enhance health and contribute to improved welfare, for the purposes of this thesis, I assume that health research is liable to benefit the well-being of populations. Where there is data that deviates from that

case of sub-Saharan Africa, it will in most cases produce a larger overall benefit. There might alternatively be other morally defensible ways to prioritise within this set that are dependent on the specific middle-income country.

From the data presented in chapter four, two important observations were apparent. The first was that disease burden in Africa's worst-off is different from that of worst-off populations elsewhere. The second was that disease burden of the worst-off is different from the disease burden in the broader category of low-income countries. These findings have two implications for middle-income country obligations more generally. First, the data presented in this thesis, particularly the disease categories and types of research relevant to the worst-off in Africa, will not be relevant to the worst-off in other regions. Data on the diseases and types of research relevant to the worst-off in other regions would have to be collected independently and used to inform duty-fulfilment in the respective region. Second, while it might be easy to assume that low-income country data is a good representation of the worst-off, the disease burden for low-income countries is a function of the disease burden of the subpopulations within these countries. Some subpopulations are poorer and some are richer, and large sub-populations that are not amongst the worst-off skew the "low-income country" disease distribution to include diseases that are not those of the worst-off. The disease burden in Africa's worst-off is more similar to the disease burden for the African region than to the disease burden for the category of low-income countries. The disease burden for Bangladesh, our "worst-off" proxy for South-East Asia, is also more similar to the disease burden for the South-East Asian region than to the disease burden for low-income countries as a whole. This data suggests that the worst-off are not most accurately represented by the broad category of low-income countries. Therefore, if a duty-fulfilling middle-income country wants to focus its resources on the worst-off in a particular region, it is better for it to focus its resources on the regional health research priorities than on the priorities for the more general category of low-income countries.

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model, I will of course take this into consideration. Otherwise this assumption is warranted, since it is plausible that there is feasible health research that will improve the health and consequently welfare of a population.

Beyond these basic principles, future research ought to address the obligations of countries like India and China, which are middle-income countries but are rapidly rising. Additionally, future research ought to explore the global obligations of middle-income countries with respect to aid more generally.

Appendices

Appendix A: Countries in the World Health Organisation's African Region

Countries in the WHO African Region*

Commonly accepted dividing line between sub-Saharan Africa and North Africa**

* Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, Democratic Republic of the Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Togo, Uganda, United Republic of Tanzania, Zambia, Zimbabwe.

** Sudan and South Sudan are classified as North Africa by the United Nations. North Africa, Somalia and Djibouti are generally considered a part of the Arab world, even though Somalia and Djibouti are geographically part of sub-Saharan Africa.

Appendix B: An overview of selected global health research priority-setting exercises

In 1990, the *International Commission on Health Research for Development*, out of concern that the health needs of poor countries were not addressed adequately by the major health research funding agencies, was the first to undertake an exercise in priority-setting for health research on a global scale (40). The commission asked how well current research investments were addressing the world's major health problems and meeting priority health research needs in developing countries. Their analysis drew attention to what was then referred to as the "10/90 gap," the recognised imbalance in the global application of research resources to address the health needs of poor and disadvantaged populations. This imbalance essentially indicated that 90% of worldwide resources for health research were being spent on 10% of the global disease burden. The ultimate goal of the commission's recommendations was to guide both foreign and domestic research investments to meet the needs of the most disadvantaged i.e. worst-off, and accelerate progress towards the goal of equity in health. Based on this, the commission recommended a five-step priority-setting approach to health research funding allocation that could informatively guide the use of both domestic and external resources. The five factors that they recommended ought to shape the research agenda included:

1. *Problem significance (disease prevalence and anticipated health impact of intervention).* Investment in research should be relative to the size of the health problem, and should not divert funds from research urgently needed on other health problems that are causing greater morbidity and mortality. Alongside this assessment, priorities should be strongly influenced by the anticipated health impact of the interventions expected to result from the research. Problems that are not classified by disease - such as financing health services, building research capacity and infrastructure, and the development of health information systems - also require research attention.
2. *Cost of intervention (cost-effectiveness measures of health impact per unit expenditure).* The cost-effectiveness of the health impact is an estimate of the

costs of addressing various health problems. Using this measure, health problems could be ranked according to years of potential life lost due to specific diseases. This kind of data could provide a framework to assist in the allocation of resources to address the diseases with the most years of potential life lost.

3. *Factors that favour successful execution.* The likelihood that research will be successful is based on a composite assessment of scientific feasibility, intellectual challenge, and the human and organizational capability of the research community.
4. *Who sets priorities for whom?* International research priorities should reflect national priorities weighted to help countries with the greatest health needs and the fewest resources. In order to weight these appropriately, any priority-setting process has to address the fundamental questions of whose voices are heard, whose views prevail, and therefore whose health interests are advanced.
5. *The time horizon of benefits.* There will always be a trade-off between meeting current health research needs and generating future health benefits. Priority-setting will involve balancing these types of research.

To move toward a greater coherence of research responses to high-priority problems at the national and global levels, the commission made additional recommendations, including that every country, especially developing countries, should develop a plan for *Essential National Health Research (ENHR)* containing some mix of country-specific health research and global health research; and that donors and international programs should earmark funds for capacity building – at least 5% of any project budget by donors should go to both individual and institutional research capacity building (40).

In 1993 the same commission established the *Council for Health Research and Development (COHRED)*, an international non-governmental organization, to monitor and promote financial and technical support for health research relevant to

developing countries (85). COHRED has coordinated a number of country-level activities to develop ENHR plans, as well as general recommendations for the priority-setting process. Ten years after the original 10/90 report, COHRED conducted its first review of the processes and methods being used for priority-setting. The analysis suggested that priority-setting processes had an ideological focus on "scientific autonomy" that resulted in a research agenda that was expert-driven, and detached from the public arena. This kind of dependence on scientific experts and directors of Medical Research Councils was not only at the country level but was also prevalent in the WHO's advisory committee on health research, at both the global and regional levels. The methods for setting research priorities had focused on the metrics of disease burdens. Less attention had been given to *who* sets the priorities and *how* choices are made.

COHRED therefore proposed a strategy of priority-setting that had the ENHR strategy as its basis, with equity in health and development as its goal. Instead of being expert-driven, this method was demand-driven in that it focused on an analysis of health needs, people's expectations and societal trends. Additionally, it involved multi-dimensional inputs (i.e. quantitative and qualitative scientific inputs, social, economic, political, ethical and management considerations) and multiple stakeholder inputs (i.e. communities, districts, sub-national and national levels). COHRED's criteria for setting priorities largely mirrored those of the original recommendations of the CHRD. Setting priorities was based on:

1. The magnitude and urgency of the health problem
2. The extent of previous research and the potential contribution of research in discovering, developing or evaluating new interventions
3. The feasibility of carrying out the research in terms of the technical, economic, political, socio-cultural and ethical aspects
4. The expected impact of the research (direct and indirect effects, short and long-term benefits and implications on issues of affordability, efficacy, equity and coverage).

COHRED emphasised the importance of seeing ENHR in the global context. While individual countries ought to weigh the resources they direct at key national problems they should also stay well informed about the international research effort. Of course, poor countries would need to focus their limited resources on their own research priorities, but should also be open to opportunities to advance jointly held concerns. Common health problems shared with other developing countries could be opportunities for collaborative, multi-country research efforts. COHRED also indicated that a number of middle-income countries such as Brazil, South Africa, Malaysia and Thailand are in a position to carry out the basic research on developing country health issues. In addition, the systematic formulation and articulation of national research agendas are important inputs into the global research agenda and there should be an emphasis on ensuring an upward synthesis of national priorities at the regional and global levels (86). COHRED does not currently endorse one particular method for priority-setting above any others but rather recommends choosing from among methods that are best suited to the local context and needs.

Building on the recommendations made by the International Commission on Health Research for Development, the WHO established the *Ad Hoc Committee on Health Research* (87)*,* which published its report in 1996. Charged with the task of identifying health needs and related research priorities in low- and middle-income countries, the committee identified specific high-priority product development opportunities using a systematic five-step process, similar to that used by COHRED: 1) Calculate the burden of the condition or risk factor; 2) Identify the reasons why the disease burden persists; 3) Judge the adequacy of the current knowledge base; 4) Assess the promise of the research effort; and 5) Assess the adequacy of the current level of effort.[91] The Ad Hoc Committee proposed a global research agenda based on this 5-step priority-setting process. This process was later taken forward by the Global Forum on Health Research at the global level in order to address identified research gaps. This same process was also used as a foundation in the development of

[91] See page 5 of the 1996 WHO Ad Hoc Committee report for more detail on the approach and methods used. See also Table 4.2.1 for a comparison of the priority-setting criteria used by different groups.

a conceptual model for a later WHO health research priority-setting exercise, *Priority Medicines for Europe and the World* in 2004 (88).

In 1998 the WHO's Advisory Committee on Health Research (ACHR) published a research policy agenda for science and technology to support global health development (89). Since billions of people, particularly poorer populations in low-income countries, do not benefit from many current advances in science and medicine, the underlying motivation for this work was to work towards re-orienting at least part of global research towards global problem-solving and the promotion of health development for the world's underprivileged. Their report suggested that an acceptable list of criteria for global health research priority-setting still needs to be agreed upon, but as a starting point, relevant criteria were considered and proposed. These include: The scale and urgency of the need, based on health level assessment and on an understanding of the fundamental causes of the health problem; the likelihood of success in any research; the availability of human and other resources to do the work; the likely time scale; the consequences in subsequent years of the possible interventions likely to follow from the research; and the existence of other options for intervention outside the health sector.

The *WHO-IFPMA Working Group*[92] convened in 2001 to identify definitively those infectious diseases that are most in need of new medicines or vaccines, and to give some sense of the priority areas for *additional* research. The approach employed was to establish a working list of infectious diseases and apply a combination of 17 assessment criteria (90, p.9). These criteria can be broadly grouped into three categories: 1) *Disease burden and future trends*, including DALYs, mortality, costs to society, proportion of population treated per annum, and projected trends over the next 20 years; 2) *Existing interventions*, including non-drug interventions, effective available drugs, whether treatment prevents secondary cases, and limitations of

[92] The WHO-IFPMA Round Table was a joint task force comprising representatives of the World Health Organization (WHO) and the International Federation of Pharmaceutical Manufacturers Associations (IFPMA). The final results and recommendations were never published. For more information see: WHO-IFPMA Round Table. Working paper on priority infectious diseases requiring additional R&D. Geneva: World Health Organisation; 2001 [cited 2011 March 9]. Available from: http://www.who.int/intellectualproperty/documents/en/IFPMA.pdf

existing drugs; and 3) *Medicines research and development needs and priorities*, including desirable non-drug interventions, new drugs needed, the technical feasibility of new drugs, current industry levels of engagement, and the public sector support needed to engage industry in new research. Using these assessment criteria, the working group established a list of priority diseases with scientifically tractable targets but insufficient product research.

More recently, several other organisations, agencies and forums have continued to build on previous efforts to establish priorities for global health research. The *Global Forum for Health Research (GFHR)* (91) created a priority-setting tool called the *Combined Approach Matrix (CAM)* (92) that systematically brings together current knowledge on a particular disease or risk factor and allows identification of common factors by looking across diseases or risk factors. The tool has recently been further refined into a *Three-Dimensional Combined Approach Matrix (3D CAM)* (93). This revised approach aims to capture forms of discrimination, marginalization and vulnerability with a view to research priority-setting benefiting those with greatest need. The UNICEF-UNDP-World Bank-WHO Special Programme for Research and Training in Tropical Diseases (TDR) prioritises research by using an adapted version of the Global Forum's framework for priority-setting (63).

The WHO's *Priority Medicines for Europe and the World* combined a number of methods to produce a methodology that they intend for use in priority-setting at country, regional and global levels (88). The project used the systematic five-step process of the Ad Hoc Committee on Health Research as a basis for its own conceptual priority-setting model. The approach was also based, in part, on the methodology employed by the GFHR and the TDR. Specifically the Priority Medicines Project used three complementary approaches: 1) an evidence-based approach (where adequate data were available on burden of disease and the efficacy or lack thereof of existing treatments or interventions); 2) projection or trend analysis methods (where data on burden of disease or efficacy did not exist, which is based primarily on consensus judgments and observational and clinical evidence); and 3) principles of social justice, social solidarity, and equity (for orphan and neglected

diseases, diseases affecting vulnerable groups such as women, children and the elderly, or where there was market failure).

Finally, in 2006 the Child Health and Nutrition Research Initiative (CHNRI) conducted a priority-setting exercise with a more specific focus on global child health (94). The group assessed global child health research priorities within particular disease categories and conditions. The basic components used in their exercise included the: 1) Likelihood that it would be ethical to do this research; 2) Likelihood that the resulting intervention would be effective in reducing disease burden, 3) Deliverability, affordability and sustainability of resulting intervention, 4) Maximum potential of intervention to reduce disease burden; and 5) Effect of disease burden reduction on improving equity in the population. The scope of the exercise was also broad, capturing not only research designed to produce new products and knowledge, but also research aimed at the implementation of this knowledge to reduce disease burden.

Appendix C: Health statistics for the worst-off (12 poorest countries) compared to selected countries, income groups and regions

							Distribution of YLL by broader causes (%)[7]			Distribution of causes of death among children <5yrs (%)[8]				Cause-specific mortality rate (per 100 000 population)[9]		
	GDP per capita 2010[1]	**GDP per capita PPP** (current intl $) 2010[2]	**GNI per capita PPP** (current intl $) 2010[3]	**LE** (yrs) 2009[4]	**U5MR** (per 1000 live births) 2009[5]	**Adult mortality rate** (per 1000 live births) 2009[6]	**Communicable**	**Noncommunicable**	**Injuries**	**Diarrhoea**	**Pneumonia**	**HIV**	**Malaria**	**Malaria**	**TB in HIV-neg cases**	**HIV**
Selected comparator countries																
Norway		$56 894	$57 100	81	4	67	6	80	14	1	1	0	0	0,0	0.2	~
USA		$47 184	$47 120	79	8	106	9	72	19	0	1	0	0	0,0	0.2	~
Germany		$37 591	$38 140	80	4	76	5	87	8	0	1	0	0	0,0	0.2	~
Brazil		$11 127	$10 920	73	21	154	20	56	24	3	6	1	0	0.1	2.1	~
South Africa		$10 486	$10 280	54	62	496	69	19	12	9	9	35	0	0.3	39	721
Thailand		$8 490	$8 120	70	13	205	79	15	6	12	11	1	0	0.2	52	627
China		$7 536	$7 570	74	19	116	15	65	19	3	15	0	0	0,0	12	1.9
India		$3 586	$3 560	65	66	212	52	35	13	13	20	0	0	1.9	23	14
Lesotho		$1 533	$1 840	48	84	611	77	15	9	8	11	31	0	0.1	9.5	680
Bangladesh		$1 643	$1 800	65	52	234	52	34	14	13	16	0	1	1.8	51	0.1
20 poorest countries (12 countries representative of worst-off)*																
Burkina Faso	$1 304	$1 247	$1 250	52	166	353	82	12	7	16	18	1	28	221	56	45
Nepal	$1 205	$1 190	$1 200	67	48	196	60	31	10	17	16	0	0	0	21	16
Haiti	$1 338	$1 102	$1 110	62	87	251	72	22	6	22	22	3	1	5.7	30	71
Uganda	$1 195	$1 263	$1 240	52	128	449	76	13	11	18	15	6	16	103	29	196
Mali	$1 172	$1 057	$1 020	53	191	286	85	11	4	22	21	1	16	131	87	34
Rwanda	$1 149	$1 155	$1 150	59	111	279	77	15	8	24	16	3	2	15	76	41

							Distribution of YLL by broader causes (%)[7]			Distribution of causes of death among children <5yrs (%)[8]				Cause-specific mortality rate (per 100 000 population)[9]		
	GDP per capita 2010[1]	**GDP per capita PPP** (current intl $) 2010[2]	**GNI per capita PPP** (current intl $) 2010[3]	**LE** (yrs) 2009[4]	**U5MR** (per 1000 live births) 2009[5]	**Adult mortality rate** (per 1000 live births) 2009[6]	**Communicable**	**Noncommunicable**	**Injuries**	**Diarrhoea**	**Pneumonia**	**HIV**	**Malaria**	**Malaria**	**TB in HIV-neg cases**	**HIV**
Guinea	$991	$1 083	$1 020	52	142	409	73	19	8	13	16	1	28	165	73	46
Ethiopia	$954	$1 033	$1 030	54	104	412	70	20	9	27	17	2	2	10	64	~
Mozambique	$933	$935	$920	49	142	493	76	15	8	11	16	10	23	171	31	325
Madagascar	$932	$961	$950	65	58	236	69	24	7	21	20	0	3	8.5	57	8.6
Malawi	$884	$876	$850	47	110	599	73	17	10	12	14	13	17	87	22	337
Togo	$826	$991	$890	59	98	307	76	18	6	15	18	4	19	65	113	117
Sierra Leone	$759	$821	$820	49	192	387	85	10	5	14	15	1	29	239	153	49
CAR**	$745	$783	$780	48	171	464	78	14	7	14	17	4	28	192	40	248
Niger	$719	$723	$720	57	160	228	90	8	3	19	20	1	21	184	41	28
Eritrea	$679	$542	$540	66	55	211	64	23	14	22	20	2	0	0.7	14	33
Liberia	$424	$416	$340	56	112	362	82	14	4	14	15	3	22	98	60	91
Burundi	$400	$405	$400	50	166	415	78	14	8	24	17	5	5	39	72	175
Zimbabwe	$354	~	~	49	89	606	87	9	4	8	11	25	4	40	37	661
DRC***	$332	$345	$320	49	199	387	82	11	7	18	19	1	21	193	76	~
Worst-off proxy (12 countries)				**52**	**150**	**401**	**81**	**12**	**7**	**17**	**17**	**5**	**17**	**129**	**62**	**173**
20 poorest countries				55	126	367	77	16	7	18	17	4	14	98	58	126
Africa				54	127	383	78	15	7	17	16	5	18	94	52	177
South-East Asia				65	59	209	49	36	15	13	20	0	1	2.9	27	13
Low-income countries				57	117	321	72	18	10	18	18	3	13	56	48	87
World				68	60	176	48	38	14	15	18	2	9	12	20	33
Middle-income countries				71	22	184	28	53	19	7	11	7	0	0.2	7.6	43
High-income countries				80	7	88	7	77	15	1	3	0	0	0	1	~

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~ Indicates that no data was provided for this country for this specific indicator

* As plotted in Table 4.2: Mapping a population representative of the worst-off in Chapter 4, where I attempt to capture a group of people that we are certain are amongst the global worst-off. These 12 countries are both the poorest economically, ***and*** have the poorest health indicators. Given this, they are certainly among the global worst-off.

** Central African Republic

*** Democratic Republic of Congo

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