Chapter I: Introduction

In this era of globalization, it is increasingly evident that events in one part of the world, have repercussions throughout the global community. Be it a natural disaster in Asia, or an economic crisis in South America, the interconnectedness of events in today's world makes once regional problems into issues of international importance. Nowhere is this more pronounced than in matters of international public health. Recent epidemics such as SARS, drug-resistant TB, and AIDS have startled the international community into acknowledging how far reaching "local" health problems can be. In each of these cases, however, international notoriety was only achieved once the diseases began spreading to western nations. Despite all the recent advances in international cooperation and global conscientiousness, it seems that global health organizations focus mainly on those international health problems that affect first world nations.

The incomplete mission of global malaria containment is a clear example of how an "international" health problem was abandoned once eradication was achieved in first world nations. Malaria was considered the most pressing health problem in the United States well into the 20th century. However, the disease slowly faded into obscurity during the mid-century with the success of the American eradication campaign. Despite this limited containment, the powerful effects of malaria are still felt across the globe today. In Africa, it was the number one cause of deaths until it took second place to AIDs in 1999, and today one in twenty children worldwide, die ever year of malaria related causes (Rosenberg, 2001). The costs of malaria include decreased productivity in

adults, decreased birthrates, unemployment, regional economic depression, developmental disorders in children, stunted growth in children, and decreased education due to absenteeism (Economic Commission for Africa [ECA], 2004). Yet, despite the severity of its effects, the virulent nature of this epidemic remains conspicuously absent from the public eye.

Historians and scientists alike have many theories as to why malaria was successfully contained in the first world, but remained mostly unchecked in the developing world. Some blame the residual attitudes and policies of the colonial era. Others believe over-dependence on technology, in particular DDT, led to an unsustainable undertaking in malaria eradication. Still others blame World War II and the ensuing Cold War for re-establishing a harmful 1st world – 3rd world order instead of a comprehensive initiative for universal global health. Others claim that because international organizations and their finances are controlled by first world nations, the focus has shifted away from prevention toward crisis control and spot solutions. The reality is that all of these factors have contributed to the existing state of global health initiatives.

While many analysts have places unilateral blame on a single factor in the history of international public health, few have analyzed the interplay of factors and their implications for current policies. We must further explore the history of the development of epidemics as well as the history of their containment. In doing so we will better understand both the challenges facing developing nations today and the pitfalls/benefits of potential solutions. By learning from past mistakes and successes, there can be hope for the millions dying from preventable disease throughout the world. This paper will approach suc-

cessful containment of current malarial epidemics by analyzing: past instigating factors of malaria epidemics, the contributing reasons for past successful and failed eradication campaigns, and a comparison of potential policy changes for the future.

Chapter II : The Colonial Era

While Malaria epidemics have been recorded since the time of the ancient Greeks, the modern malarial plague came to full force during the mid to late British colonial era (Williams, 1969; Humphreys, 2001; Harrison, 1978). As such, the plague reached such proportions that scientific study of the disease and potential cures gained paramount importance to the British colonial administration where it was labeled the world's largest health problem. Discoveries pertaining to the parasite, even earned several Nobel Prizes during the late 1800's. The international nature of the epidemic also encouraged public health cooperation between many nations for the first time. Despite the significance that the malaria epidemic held in the minds of so many, colonial administrators and military officials were often resistant to scientific discoveries about the spread of malaria. Instead, they preferred to cling to prejudiced ideas, blaming "uncivilized" native populations for the introduction and spread of the disease. It is a sad irony that the actions of colonial powers at home and abroad did far more to instigate the spread of malaria, by shifting ecological, sociological and demographic balances that had previously existed in colonial nations.

2.1 Colonial Study of the Etiology of Malaria

Malaria is a disease that relies on several organisms to survive (Basch, 1990; Kiple, 1993; Williams, 1969). In fact its life cycle is so seemingly fragile that one wonders how it wreaks the havoc it does. The disease itself is caused by a plasmodium that requires first a mosquito and then a mammalian host. To spread the disease, a

night-feeding, female mosquito must bite an infected animal, allow enough time for the plasmodium to gestate inside her, and then must bite other uninfected animals before her short life-span ends, passing on the vector. Only one species of mosquito can act as a carrier, the *anopheles*, and even then, only the female of that species can do so. As mosquitoes have a maximum life-span of a few weeks, this life cycle seems fragile at best. However, with a large enough infected population the disease can spread voraciously. These complex elements of malarial infections took decades to be discovered and proven, and even longer to be widely accepted as truth.

The etiology of malaria was discovered in stages over a period of several decades running from the late 1800s to the mid-twentieth century (Harrison, 1978; Williams, 1969; Humphreys, 1996). A French army surgeon named, Charles Laveran first noticed the parasite in a sample of infected blood in 1880. At the time, he was met with wide scale skepticism in the scientific community, but twenty-seven years later he was honored with a Nobel Prize for his discovery. In 1886, Camillio Golgi, a famous Italian physician who also won the Nobel Prize for his many important microbiological discoveries, confirmed that the parasite existed. Furthermore, he studied the life cycle of the parasite and correlated stages of parasitic replication to cycles of malarial symptoms in the patient. Despite this knowledge, however, no advances in malarial treatments could be made until scientists found out how the parasite entered their hosts.

British physician Patrick "Mosquito" Mason discovered the anopheles vector, in 1895, when he discovered the plasmodia in the stomachs of dissected mosquitoes (Harrison, 1978; Williams, 1969; Humphreys, 1996). Despite the mockery of the British

science community, he postulated that mosquitoes were an immutable link in the life-cycle cycle of the malarial parasite. He sought the help of an army surgeon named Ronald Ross to confirm this theory. Over the next three years Ross studied mosquitoes at his post in India, to find that the plasmodium indeed could not survive without a mosquito intermediary. By 1898, Ross filled in the final stages of the plasmodium's life cycle with his discovery that spores, which grow in the mosquito, later infect humans though the mosquito's saliva. Ross went on to campaign against malaria with further studies on the plasmodium and on vector control methods. He also received a Nobel Prize for his work, and Patrick Mason was knighted for his discovery.

2.2 Colonial Causes of the Plague

The governmental support of research into the etiology of malaria was mostly spurred by the devastating impact that the disease had on colonial empires. Britain especially suffered at the hands of the tiny plasmodia, who did not discriminate between colonial administrators, military officials or natives as they swept through colonial settlements. Yet few researchers examined how the actions of colonial administrations *instigated* and *exacerbated* these very epidemics. Through a callus disruption of the delicate demographic, economic, socio-cultural and ecological balances that native cultures had developed over centuries, colonial powers unleashed a virulent epidemic, which remains unchecked in many of those communities to this day. In addition military and civil leaders in colonial areas clung to bigoted, prejudiced views on controlling and

preventing malaria instead of embracing new scientific reasoning. These colonial failings both caused and prolonged malarial epidemics in the region.

The arrival of colonial powers portended drastic changes in local demographics. In tropical colonies such as those in the Pacific Rim, Caribbean, and the Asian subcontinent, colonists established extensive plantations, mines, and estates to maximize production of local goods for export. In order to do this, colonial powers seized all local land and distributed it in large tracts to wealthy landowners. This process is referred to as *caciquism* (DeBevois, 1995). As a result, native populations were forced off their ancestral land, and onto less desirable terrain. The effects of this kind of shift were especially pronounced in the case of the Philippines, where natives were forced to move into the hitherto avoided lowlands. These wet jungles had long been avoided for their "fevers." The thick brush and moist environment made it a thriving breeding ground for the anopheles mosquito and therein malaria. Once the colonists forced these lands to become home to the displaced native population, malaria epidemics began sweeping their plantations and military camps (Anderson, 2006). Also, with their private tracts seized, the local population had no other viable employment aside from colonial enterprises. Out of necessity, many locals worked several jobs during harvest season, sometimes in different regions. As a result, there was far more population movement than ever before, which further increased the transmission of malaria from region to region (DeBevois, 1995). In regions such as India, malaria affected populations even further by preventing women from carrying babies to term. As a result, on some estates no children were born for years on end despite there being incentives and

special treatment offered for expecting mothers (Williams, 1969). These kinds of demographic shifts had the devastating effect of starting and spreading malaria epidemics in regions that had never faced such plagues before.

Colonial mismanagement and exploitation also led to major shifts in economic factors (Williams, 1969; Packard, 1997). Of these, two effects are most pronounced: a policy of viewing workers in terms of economic value and the narrowing of economic possibilities within pre-existing social classes. The first of these ultimately decreased the value of human life in a way that has never been fully changed even in post-colonial times. With the vast economic benefits available to them through their new colonies, colonial powers focused primarily on maximum profits. At the time, it was more profitable to simply hire new workers than to provide care and benefits for the existing workers. This view of workers as expendable factors of production did not change until the World Wars highlighted the growing scarcity of workers and need for new consumption markets. As malaria epidemics spread, colonial powers realized that to provide for their own health, some preventative measures had to be taken. In his analysis of post-war public health initiatives Randall Packard quotes one 1948 health official as stating, "Africa cannot be fully exploited because of flies and mosquitoes; if we can control them the prosperity of Europe will be enhanced" (Packard, 1997, p. 96). Attitudes such as this kept the focus on third world health in terms of first world benefits. In this way, the unhealthy viewpoint started by colonial powers continued to cripple developing regions as health services remained concentrated in industrial areas and socio-economic infrastructure was ignored.

Figure 2.1 "From Cairo to Capetown" 1892 political cartoon in *Punch* magazine, depicting Cecil Rhodes spanning Africa

Colonial enterprises exploited local populations for hard labor and often began near-feudal societies where social mobility was impossible. Ineffective anti-malarial strategies strengthened these trends creating an inescapable class structure (Williams, 1969; Anderson, 2006). Malaria contributed to this by decreasing a worker's productivity and therein preventing a build up of capital. For many tenant farmers inescapable debt could also be attributed to malaria. The parasite killed or weakened livestock while doing the same to the farmers. This combination drastically decreased productiv-

ity and caused infected farmers to become entrenched in debt while remaining unable to harvest their crops. Colonial estate workers saw a similar fate. For example, in India, working at a colonial estate was known to have high fatality rates due to untreated malaria. However, because natives had few alternative choices of employment they were forced to accept these risks in order to support their families. On select estates estate owners established their own anti-malaria strategies including administering bed nets, draining standing water, and providing screened housing. On these estates, laborers could work with the knowledge that they had a higher chance of returning home healthy. As a result they could return for many seasons and work their way to a higher standard of living. Without malaria control, however workers were doomed to life as an expendable factor of production with little chance for survival.

The plight of the malaria-infected tenant farmer or estate worker is as much a product of colonial ecological manipulation as it is a product of colonial economic systems. The introduction of new diseases along with drastic changes in farming techniques, irrigation, pesticides, and large-scale agricultural enterprises all changed the preexisting ecological balance, therein contributing to the expanding malaria epidemic.

Colonial expansion introduced many new diseases to their colonies (DeBevois, 1995; Mitchell, 2002). For example, colonies like Egypt had been untouched by malaria until colonial times. It is thought that the parasite was transported there by air land and/or boat with the increase in colonial traffic. Further disrupting the colonial ecosystems was the introduction of the rinderpest virus which heightened the severity of malaria epidemics in Egypt, the Philippines, and other colonies. This virus mainly

killed livestock, which had two main affects on malaria. First with dying livestock, mosquitoes had fewer non-human alternatives for blood meals. Second, with no livestock, farmers were forced to plow and harvest crops with no animal power. This weakened the farmers who were already at a higher risk of malaria infection, because the mosquitoes had been forced to seek human blood meals. In turn, weakened farmers were more susceptible to malaria attacks. At the end of this harsh cycle, many fields lay fallow as farmers fell to the epidemic. Soon these fields turned to brush, which provided even more breeding grounds for malaria carrying mosquitoes. Thus, the malarial cycle was perpetuated, sometimes never regaining an ecological balance.

Colonial powers also shifted local ecosystems by drastically changing farming methods (Mitchell, 2002). For example in the Gambia, Senegal and Egypt, vast new irrigation systems and flood-preventing dams created unprecedented standing water near native populations. In addition natives soon became dependent on western introduced chemical fertilizers. As a result, these nations experienced a desperate famine when fertilizer supplies were cut off during the World Wars (see Ch. III). In addition, new standing water, concentrated worker settlements, and the introduction of malaria combined to further cripple native farmers, as malaria epidemics began spreading in starving communities. Weakened by malaria and lacking colonial agricultural supplies, these African nations went into a downward spiral of famine. Ironically, many of the colonial agricultural enterprises still produced some surplus during this time, though natives gained no relief at all.

While these cases exemplify the dangers of "progressive" colonial influences, backward colonial influences were equally detrimental (Anderson, 2006; Williams, 1969; DeBevois, 1995). Colonial powers brought with them racist ideologies and often resisted scientific discoveries that countered such ideas. For example, the racial prejudices of colonial military officers often motivated their public health solutions more than scientific facts did. In one case colonial officials in the Philippines forced natives to move both farms and settlements away from military camps in the highlands claiming that "the greatest danger to the white man lies with the native" (Anderson, 2006, p. 208). This forced people into mosquito infested lowlands and crippled the local agricultural economy. This all occurred long after the mosquito was discovered as a parasite carrier. However, when malaria persisted, colonists still blamed the epidemics on a lack of hygiene, and claimed that "civilization and cleanliness" would cure the "promiscuous defecators" (Anderson, 2006, p. 207). This kind of colonial view of native inferiority reflected an oversimplified view of public health solutions and created an unsubstantiated connection between morality and poor health. By clinging to racial reasoning and refusing to acknowledge alternative causes, the colonial administration lost valuable ground in stemming the malaria epidemic.

Racial thinking has been prevalent in many malaria-ridden parts of the world. For example, one cannot separate colonial hindrances to malaria containment from similar issues within the American South (Anderson, 2006; Humphreys, 2001; Harrison, 1978). The fact that 70% of this virulent epidemic existed on plantations is indicative of its inherent connections to race and economic inequality (Anderson, 2006,

p.216). The major differences lie within the government's response to malarial epidemics on a bureaucratic level. While racism in the American south persisted on a local level, on an official level, the American government embraced new discoveries about parasitic epidemics and focused on the cutting edge ecological solutions to the problem. In contrast, the Colonial British government clung to racial solutions such as hygiene education and the sequestering of natives from foreign occupiers, while resisting new techniques and breakthroughs. These differences in governmental approach have had many persisting repercussions in the fate of the regions under their control. For example, the Americans implemented effective drainage and pesticide campaigns, which eventually led to vastly improved local health and epidemic containment.

In hindsight, it is easy to unilaterally blame colonial powers for all subsequent ails in their colonies. The reality is rarely so clear-cut. Exploitative and mismanaged colonization certainly played a large part in the spread of malaria epidemics, however, it is not alone in producing wide disparities in the implementation of epidemic controls. Nonetheless, the residual social structures, economic inequalities, ecological mismanagement and demographic shifts started by colonialism have had lasting effects.

Chapter III: The Rockefeller Era of Cooperation

3.1 The International Health Division and the Start of the American Anti-Malarial Campaign

The story of malaria in the United States covers most of American history through the 1950's. It provides a successful example of philanthropic organizations working with states to execute public health campaigns. By the turn of the 20 century, malaria had been heralded by many experts as the most devastating disease in the world (Williams, 1969; Farley, 2004). With the success of William Gorgas in containing the many diseases hindering the construction of the Panama Canal, millionaire John D. Rockefeller was inspired to attempt what had hitherto been inconceivable: to attempt the eradication of fatal diseases. By 1900 he put in place the makings of a health commission to analyze the problems to be addressed, and several years later, he created the Rockefeller Foundation to "promote the well being of mankind throughout the world" (See Figure 1) (Shaplen, 1964, p 21). The foundation went on to be one of the largest philanthropic organizations of all time, undertaking campaigns regarding higher education, agricultural aid, civil programs, and most of all health initiatives.

Figure 3.1 The Rockefeller Foundation seal and motto (Farley, 2004)

The Rockefeller Foundation was by far the most active organization of any kind to undertake public health campaigns in the early century. In fact it addressed problems that the government had long ignored and allocated *double* the US federal health budget for

Figure 3.2 "Malaria is a Fashionable Disease" A malaria political cartoon from the late 1880's.

their own campaigns (Williams, 1969). Many Americans felt that the government was under reporting the prevalence of the disease and avoiding action by denying the significance of the epidemic. Figure 2 depicts one of many political cartoons exaggerating the extent of such misinformation and avoidance of action. Where the Foundation differentiated itself, however, was in its devotion to being a "partner but not a patron" of the government (Shaplen, 1964, p 21). This desire to work within the infrastructure of a national bureaucracy resulted in the added benefit of the Rockefeller Foundation building the capabilities and awareness of domestic public health departments. Instead of replacing government action, it illuminated health problems, and equipped the government to

address them. This legacy, which it left after both its campaigns in the US and abroad, may have been one of the crowning achievements of the Foundations history.

Despite its cooperation with governments, however, the Rockefeller Foundation sought to succeed where previous government intervention had been inadequate. The International Health Division (IHD) of the Rockefeller Foundation was founded in 1913, to specifically carry out the *health* aspects of the Rockefeller family's philanthropic vision (Farley, 2004; Shaplen, 1964). The Foundation began its interest in public health in addressing the hookworm epidemic, but soon expanded its public health campaigns to include many other diseases. They established two main objectives for the organization. First, they wished to educate the public and establish strong local public health departments. Second, the Rockefeller Foundation sought to eradicate the worlds most virulent diseases, including malaria. So began a long battle that would meet varied success. Regardless of the outcomes, however, the IHD of the Rockefeller Foundation was the first international non-governmental organization (NGO) to take on health issues that crossed borders, and its actions in the following decades set the precedence for inter-state cooperation and NGO intervention that continues to this day (Williams, 1969).

One of the first battlegrounds undertaken by the IHD, was the American south, where malaria was crippling the agricultural industry, hampering social development, decreasing life expectancy and stifling economic growth (Humphreys, 2001; Harrison, 1978; Williams, 1969). Malaria epidemics had decimated the general worker population so much that previously flourishing mills were shutting down due to a lack of employees. The plight was even worse for southern tenant farmers and sharecroppers most of whom

were the already oppressed descendants of African American slaves. These oppressed minorities were already facing near impossible debt conditions. They were attempting to cultivate near infertile fields at high rents and very little profit to themselves. Additionally fickle crop cycles and unpredictable droughts left little assurance of any annual profit. With the arrival of malaria epidemics, these farmers were left too weakened to cultivate their fields, harvesting even less than usual. This exacerbated the already severe sharecropping debt cycle.

Malaria had many other consequences throughout the nation. School attendance in malarious regions dropped to rates as low as 50-25% (Humphreys, 2001; Harrison, 1978; Williams, 1969; Farley, 2004). Construction projects were hindered and rising debt combined with decreasing productivity retarded economic development. By the early teens, all of these factors had become too dire to ignore. Both the US government and the Rockefeller Foundation began to take notice. By 1914, the IHD considered malaria as its largest pathogenic adversary.

The interests of the IHD in the US were aided by several key individuals in the field of public health (Humphreys, 2001; Harrison, 1978; Williams, 1969; Farley, 2004). A veteran of the IHD hookworm campaigns, Wycliff Rose, soon expanded his public health interests to malaria. After a worldwide tour to assess tropical diseases, he concluded that malaria was the world's most serious health problem (Williams, 1969; Farley, 2004). To accomplish the IHD's goal of disease eradication, Rose and other IHD officials sought the help of the US Public Health Service (USPHS) forming the first collaboration between a state and an international non-governmental organization in the interests of a public

health campaign. The USPHS volunteered the doctors Henry Rose Carter and Rudolph von Ezdorf who joined Rose in starting the first comprehensive domestic anti-malarial campaign.

The appointment of General William Gorgas as Surgeon General aided the initiative as well (Harrison, 1978; Williams, 1969; Farley, 2004). Gorgas had gained fame by saving the Panama Canal Project from the debilitating effects of yellow fever (also a mosquito carried disease). In Panama Gorgas pioneered mosquito control as a method of general sanitation, and developed larvicidal regimes including oiling, drainage, screening, and brush clearing. As Surgeon General and a commissioner of the IHD, he and the Foundation employees faced the challenge of adapting these methods for cost-effective, wide-scale use in the American south.

The IHD's campaign with the US federal government essentially started as a social experiment (Humphreys, 2001; Harrison, 1978; Williams, 1969; Farley, 2004). Fueled by the success of past experimental measures, the IHD began implementing control initiatives in the hardest hit regions. An early postcard survey of rural doctors revealed that the south experienced about one million cases of *reported* malaria every year. This confirmed the hard work ahead for the collaborative team. The ultimate success of the program was due to three main breakthroughs however. The first break through, discussed above, was the developments of general William Gorgas in the management of mosquitos at the larval stage. Methods such as drainage, water surface treatments, brush clearing and building screening, when applied to civilian communities, all made huge strides in containing malaria. The second major break through was the standardization of quinine doses, and the

third was the development of local teams to tailor the campaign for each region. While other IHD-USPHS methods were instrumental, these three developments most significantly spurred on the success of the initiatives.

Figure 3.3 A screening campaign ad

The first campaigns used mostly the methods developed by Gorgas in Panama, such as drainage, screening, bed nets, oiling and brush clearing. They took place in mill towns where production had stopped because workers were too weak to function. Rose, Ezdorf and Carter began campaigns in mills towns in Mississippi, and North Carolina, where early programs met with so much success that they expanded the initiatives to Virginia, Alabama and other southern states. The IHD made use of the new arsenic based larvicide *Paris Green*, which targeted only surface dwelling, filter-feeding larvae such as the *anopheles*. They also augmented the physical projects such as draining with

informational campaigns regarding screening homes (see Figure 3.3) and avoidance of mosquito ridden areas.

The second wave of success came from the experiments of Dr. Waller Leathers and Dr. Charles Bass (Humphreys, 2001; Harrison, 1978; Williams, 1969). In Bolivar County, Mississippi, the doctors began studying the effectiveness of quinine alone in the containment of malaria . Quinine had been used by South American Natives to treat malaria starting in the 1600's, however the specific mechanism and dosages of the drug had never been closely studied, nor had the benefits been officially confirmed. By administering various standardized dosages of quinine to infected populations of malaria patients, Leathers and Bass discovered that an eight week course of daily 10 grain quinine dosages had a 90% efficiency rate in curing the disease. This momentous breakthrough resulted in the standardization of quinine dosages which in turn allowed it to be more widely distributed (outside of doctors offices) and lowered the cost. As a result, quinine courses could be found at most local stores, annually costing the average person between $0.38 to $1.09 for treatment (Williams, 1969). Over time the "Bass treatment," as it was called, became even further generalized when it was discovered to be a prophylactic treatment. By the start of the World Wars, the US military had adopted quinine as a standard part of their health regime.

The success of the IHD collaborative in the US south continued after the adoption of quinine. This was largely due to the groundbreaking policy of dividing the control of the IHD campaign among small localized teams (Humphreys, 2001; Harrison, 1978; Williams, 1969; Farley, 2004). Each of these local teams tailored the anti-malarial

campaign to each region based on economic, social and ecological factors as well as the prevalence of locally available resources. These teams also monitored success, carried out public awareness campaigns, and assessed the need for specific funding. By narrowing the focus of each campaign, the IHD was well on its way to controlling malaria in the American South by the start of World War II.

The IHD presents an example of a successful government-NGO collaboration to address a serious public health problem. By working with government bureaucracies, implementing new *mosquito* control methods, introducing standardized prophylactic treatments and working on a tailored local level, the IHD was able to attack malaria in an unprecedented way. However, the battle with malaria in the United States had one final chapter. The discovery of DDT struck the final blow to an already retreating disease. However, as we will discuss in future chapters, while DDT revolutionized how people approached the problem, it created problems of its own.

3.2 Brazil and the Eradication of a Species

The IHD had many campaigns outside of its collaboration with the American government. Its global vision of malaria eradication was an ambitious one, with a near endless scope. To start, the organization focused on regions where malaria was most virulent. One such area was Brazil, which, in 1938, experienced one of the largest malarial epidemics in the western hemisphere (Williams, 1969). In the face of this emergency, the International Health Division of the Rockefeller Foundation embarked on one of its most ambitious, and ultimately most successful, endeavors in eradicating an entire species from

the South American Continent. The target was the deadly *Anopheles gambiae* mosquito. The campaign not only saved countless lives in Brazil, but it also inspired similar campaigns in Sardinia, Sri-Lanka, Egypt, and other malaria ridden regions.

While malaria had previously existed in South America, the continent was blessed to have a native species of mosquito relatively ill-suited as a malaria vector (Williams, 1969). Because of this, malarial epidemics had been relatively contained in the region. With the advent of faster modes of transportation such as airplanes and fast ships, however, South American became increasingly connected to the rest of the world. These effects of globalization were especially pronounced during the World Wars, where supplies, troops and refugees were constantly traveling between continents. It is thought that on one such exchange in 1930, the deadly *Anopheles gambiae* mosquito made its way from Africa to Brazil.

The *Anopheles gambiae* mosquito is the world's most deadly carrier of malaria for several reasons (Williams, 1969; Harrison, 1978; Farley, 2004). First, though only females can spread the parasite, gambiae females are the most efficient mosquito to spread malaria. Also, once the parasite has gestated in the mosquito the transmission rates to her future human victims are much higher than those of other mosquito species. The gambiae have frequent feeding patterns, and prefer mostly human blood meals. This tendency causes the gambiae to seek out more developed human settlements and even transportation hubs instead of more rural areas. As a result, the gambiae managed to find its way beyond the borders of its African home to parts of Asia, Europe and South America on mail carriers, produce shipments, and even passenger planes. Because transportation times were

constantly growing faster, any trip shorter than the gambiae's average life-span of several weeks could introduce a deadly, infected female to a new habitat.

The gambiae mosquito was discovered quite by chance in Brazil. The IHD already had a presence there, to battle yellow fever (also a mosquito borne disease), and had long been implementing the mosquito containment methods developed by Gorgas in Panama (Shaplen, 1964; Williams, 1969; Harrison, 1978; Farley, 2004). The Rockefeller Foundation employees were constantly carrying out assessments of mosquito containment to monitor progress. During one such routine assessment an IHD doctor, Raymond Shannon, noticed gambiae larvae among his collected samples of other mosquitos larvae. This discovery so worried the IHD specialists that it was reported as an emergency to the Foundation headquarters. Within weeks, unprecedented malarial epidemics began flaring up in surrounding areas, confirming the Foundation's worst fears. With tens of thousands falling to the disease, active IHD field officer Dr. Fred Soper made the decision to commandeer the IHD Yellow Fever Field Service for use in stemming the Brazilian malarial epidemic.

Fred Soper and his team unveiled an unprecedented campaign to eradicate the *Anophelese gambiae* from South America (Shaplen, 1964; Williams, 1969; Farley, 2004). Soper had previously distinguished himself in the field of malaria control but rose to prominence with his Brazilian campaign. He went on to become the IHD's star malariologist, and led future global campaigns with military precision. The Brazilian campaign was fueled mostly by large amounts of manpower. IHD personnel were separated into military-like units, each trusted with a given region. These units were

closely monitored by the inspectors and often Soper himself. The field officers hand-sprayed every known water source with Paris Green. They sprayed every possible home with the pesticide pyrethrum. Workers were even trained to scour building walls for resting mosquitos that they would then suck up with a suction bulb. Never before had such a detailed, thorough, and work-intensive campaign been undertaken, but the Foundation employees know the dire consequences of failure..

The expense of such a detailed operation was certainly great, costing the Brazilian government $1.6 million and the Rockefeller Foundation $500,000, yet the benefits were invaluable (Williams, 1969; Harrison, 1978; Shaplen; 1964; Farley, 2004). As Soper later stated, "No one could predict the success in an attempt at species eradication, but those cognizant of the situation could predict certain disaster... should an attempt at eradication not be made (Williams, 1969, p137)." So it was that within ten years of its arrival in South America, the *Anopheles gambiae* was eradicated from the continent. The IHD did not stop here, however. Soper and his team worked with the Brazilian government to establish laws for mandatory fumigation of all shipments/transport vehicles entering the country. Also they established teams to make routine inspections of water ways for gambiae larvae. In the years following a Foundation employee commissioned to write a review of the Brazilian mission assessed the situation astutely, stating:

> *This particular battle would seem to have been won at great labor and cost...[but] airplanes are now crossing the southern Atlantic with increasing frequency... a dead female gambiae was discovered after fumigation on a plane... and two more in January, 1942. The original infestation... could readily have been started by a single*

fertilized female. Truly the price of liberty, as far as the malaria-carrying mosquito is concerned, is eternal vigilance (Fosdick, 1942, p. 396).

3.3 Sardinia and the Eradication of a Disease

Italy's battle with malaria was a long one, made up of many stages. Awareness specific to malaria began in the early 1900's, with the efforts of Robert Koch and Angelo Celli, who saw malaria as a socio-economic disease prevalent in hardworking landless farm workers (Williams, 1969; Harrison, 1978; Farley, 2004). Left over from feudal times, these workers did not only represented the most infected populations; they also represented the most oppressed demographic, with little hope of escaping from their bleak economic fate. Koch and Celli gave voice to the under-represented plight of these workers, seeing the anti-malarial campaign as a way of bringing equality to the system.

Unlike Soper and the IHD, Italian malariologists took a different approach to fighting malaria. Instead of focusing on a battle against the mosquito *vector,* the Italian way focused on battling the disease *in* the infected populations through quinine treatments and general health care (Harrison, 1978; Farley, 2004; Shaplen, 1964). Given the limited resources of the Italian government, funding for wide-scale drainage, water surface treatment, and brush clearing was simply not available. This reality was compounded by the start of World War I which further drained the governmental funds of European nations. Instead Celli and Koch established subsidized quinine regimes, which they hoped would help the poorest citizens afford malaria treatment. Despite these efforts, however, malaria rates in Italy remained high.

As malaria rates continued to plague tens of thousands of individuals, the Rockefeller Foundation turned its attention to Italy. Dr. Lewis Hackett was set to assess the situation. While he saw merit in the treatment methods of containment, he strongly advocated some attempts at vector control. By the 1930's the Foundation had collaborated with the Italian government to create an Italian Institute of Public Health from which to base their campaigns. Hackett, later joined by Soper, proposed a two-front offensive attacking both the mosquito and the parasite. After the success of the Brazilian campaign, they advocated localized drainage, larvicidal, pesticidal and brush clearing tactics combined with quinine treatments. The was the most comprehensive multifaceted IDH endeavor yet.

Unfortunately, IHD efforts faced a stand-still with the start of World War II. Once Italy fell to Allies, however, the need for an efficient solution became even more pressing. Manpower was dwindling as the war demanded more labor and resources, and malarial epidemics were weakening an already depleted population. Hackett and Soper decided to attack the situation with military precision using their Brazilian strategy with some modifications. With fewer workers, they had to give less individual attention to every region. To compensate they added more pesticidal and larvicidal treatments, as well as prophylactic treatments of quinine. The use of Paris Green as a water larvicide and pyrethrum as a indoor surface pesticide both hit mosquito populations hard. Additional funding from the United Nations Relief and Rehabilitation Administration (UNRRA) further augmented the resources for the Italian campaign.

Figure 3.4 A Wartime European DDT Ad

The year 1944 heralded the advent of DDT as a pesticidal treatment (Tren & Bate, 2001). This struck the final blow. DDT had far more staying power than pyrethrum, and a single house spraying of DDT resulted in months of mosquito proofing with no side effects on humans. Almost immediately, DDT began decreasing the numbers of infected mosquitos who could spread the disease (Williams, 1969; Harrison, 1978; Farley, 2004). The house spraying was especially effective because mosquitos were most likely to become infected by biting malaria victims in homes. After biting such a victim, if the blood laden mosquito rested on a house wall or ceiling, it would immediately die. Also, by

spraying the insides of buildings, the DDT had limited opportunity to spread into the environment.

Figure 3.5 "The 4 Freedoms from Malaria" World War II Anti-Malarial Ad Advocating a many-fronted attack on the disease

By containing infected populations with quinine regimes, and containing vector populations with pesticides, the IHD began to see a significant improvement in Italy. Malarial epidemics began decreasingly rapidly. Soper and Hackett seemed to have found the key to success in a multifaceted strategy that addressed both preventative and curative tactics. The island of Sardinia provided the best example of the sweeping success of this

campaign. From 1946 through 1953, malaria cases dropped from 75,000 to one. After 1953 malaria had been completely eradicated from the island.

Though individuals such as Soper considered the mission as a whole a failure due to the continued survival of mosquitos in Italy, the IHD campaign was more successful at stemming mediterranean malaria than ever imagined (Farley, 2004; Harrison, 1978; Williams, 1969). By targeting the goals of its mission, the IHD struck a swift blow in a concentrated amount of time. It combined the successes of previous campaigns by using environmental tactics such as draining, chemical advances such as new pesticides, population control with subsidized treatments, and preventative measures with prophylactic treatments. Because of this, they were able to decrease the infected population to unsustainable levels, therein wiping out the disease. The Italian story proves that with fewer resources than in Brazil and attention to the time sensitive nature of anti-malarial campaigns, the disease could be eradicated.

Chapter IV: Cold War Changes

With the end of World War II came a new world order of increased inter-governmental cooperation. Yet this new international system departed significantly from the Rockefeller type altruism seeking "the well being of all mankind." Instead as the Cold War set in, health aid and developmental assistance became a political tool used by the worlds most powerful nations to gain clout over their "allies". Health policies were created, not as a collaboration between aid organizations and host nations as in Sardinia and Brazil, but as unidirectional mandates from hegemonic powers. Issues like the use of DDT and the containment of AIDs clearly indicate the prevalence of western ideas and values on developing world health campaigns. While some say this trend changed with the end of the Cold War, the current world order remains remarkably similar. Be it neocolonial economic actions, Cold War political actions, or pressures from the "War on Terror," the past sixty years of international public health campaigns have been dominated by the economic, national security, and political interests of a select few nations. It is this uneven partnership between the developing and developed world that has left current campaigns stilted and out of touch with the socio-cultural, economic and ecological realities of the regions they serve.

4.1 Malaria, Neocolonialism, and Technology: the Egyptian Case

By the start of World War II, many changes in western held colonies altered the relationship between man, mosquito and malarial parasite. Paramount among these were

economic and technological changes in agriculture and industry that vastly affected the local ecosystems and new political tensions which led to the politicization of global public health initiatives and health aid. Of the new technologies, the most influential was the widespread adoption of DDT, which, by 1946, was being used throughout most of the world (Harrison,1978; Ten & Bates, 2001). However, advances in agriculture and civil infrastructure such as dams, irrigation systems and improved methods of transport also had a notable effect. In addition to these technological changes, burgeoning Cold War tensions and the emergence of strong intergovernmental organizations such as the UN created a shift from *state* and *non-governmental* initiated health campaigns to global campaigns by hegemon dominated *intergovernmental* organizations. All of these changes combined to create a new environment in which malarial epidemics flourished.

The development of new technologies, along with the start of the world wars significantly changed the supply and demand of goods in the global market and led to changes in the nature of malarial epidemics. In some cases, these changes even introduced malaria to new regions (Mitchell, 2002). During this time, the previously held colonial model of production was adapted to provide more specialized goods from a given region. Most arable land was streamlined to produce one of a few high-profit crops including sugar, peanuts, and rubber (Wright, 1997). In order to do this colonists introduced new technological aids such as fertilizers, irrigation systems, and other farming equipment, but this narrowing of production and reliance on western technology further exacerbated the colonies' economic reliance on the West (Mitchell, 2002). This reliance continued to

cripple colonial regions even after independence from the colonizing power. The case of Egypt provides an insightful example of this technological western intervention.

Egypt had gained partial independence from England in 1882, but the British colonial influence remained strong. With the outbreak of World War II, the British all but retook complete control of the nation, and remained involved through much of the mid-century. While mostly native raw materials had been extracted from Africa before World War II, during wartime colonial powers began converting all available land to the production of a few new cash crops (Mitchell, 2002). The main crop of this nature in Egypt was sugar. The British converted as much land as possible to sugar production, leaving little land for growing food. To make the terrain suitable for sugar cultivation, the British built dams along the Nile River putting an end to the traditional floods that had watered crops and replenished nutrients to the soil. To compensate for the loss of these flood related benefits, the British built irrigation systems with open channels that watered the fields. These channels created an ideal breeding ground for waterborne diseases and insects such as mosquitoes.

Also, with the new plantation based industry native tracts of farming land were seized and combined into large foreign run plantations (Anderson, 2006; Mitchell, 2002; Williams, 1969). The displaced, unemployed natives were forced to find work, often at the very plantations that had disrupted their traditional livelihoods. Better transport also facilitated new workers immigrating to the plantations. Both indigenous and transplanted plantation workers moved to crowded worker villages along the outskirts of the compounds. Also British wartime construction projects such as roads and military supply

railways, left strings of ditches and pits which also collected water. These new expanses of still water channels and the congested worker settlements combined to create a perfect environment for a malarial epidemic. The only missing factor was the malaria plasmodium.

The expansion of infrastructure and advancements in transportation technology before and during World War II, facilitated a wide expansion in trade and export which introduced new diseases and species into Egypt (Mitchell, 2002; Williams, 1969). As a result of better transportation, ports and export highways saw more traffic than ever before. Goods from all over the world, became available in previously remote areas. Workers were also able to move more easily, traveling to plantations, factories and other labor centers. However, along with foreign workers and goods come foreign insects and diseases. So it was that in 1942, the *Anopheles gambiae* first found its way to Egypt carrying inside it, the deadly malaria parasite. It is thought that the Sub-Saharan mosquito and parasite arrived in Egypt either with produce from the south or on airplanes carrying war supplies from the north. Either way, the previously unexposed Egyptian public had no natural defenses against the disease, leaving them unknowingly vulnerable.

Once the disease was introduced, malaria spread rapidly through out crowded labor settlements. Modern malariologists now know that with a sufficient vector population, a malaria epidemic can take hold in a completely uninfected population within *one month* (Williams, 1969; Mitchell, 2002; Basch, 1990). By 1943, malaria had spread to epidemic numbers in Egypt, but the neocolonial British authorities suppressed this information from the public. With a war in Europe, they feared that discontent in Africa would lead to

distracting uprisings. In an echo of its colonial philosophy of rule, the British sacrificed the well-being of the native population and the public's right to information in order to maintain unchallenged control. Also, by hiding the numbers dying of malaria, the British authorities lost valuable time in fighting the epidemic, and by the time the number of deaths became too significant to ignore, the benevolent "white men" had a new "burden" in the worsening war in Europe. This left the puppet Egyptian government to try and stem an unprecedented health crisis.

The introduction and widespread adoption of western synthetic chemical compounds added to the severity of the malaria epidemic. With the construction of Nile River dams, native farmers lost the annual floods that fertilized their fields. The British brought in a new alternative in fertilizers to replenish the diminishing nitrates in the soil. In his book *Rule of Experts*, Timothy Mitchell claims that this influx of chemicals had as vast an evolutionary effect at the cellular level as dams and irrigation systems had on the national level (Mitchell, 2002, p. 21, 25). Mitchell proposes three main ways in which the new fertilizers accomplished this.

First, artificial fertilizers are difficult to apply and are easily washed into nearby bodies of water (Mitchell, 2002). Once in these fertilizers entered Egyptian streams and ponds, they caused previously insignificant pond plants to flourish. Bodies of water became so clogged with plant growth that it interfered with currents, creating near still streams. The new growth also provided shelter to mosquito larvae, allowing the vectors to flourish as well.

Ironically, the second way the adoption of fertilizers aided the spread of malaria, was by contributing to a famine that left natives weak and vulnerable (Mitchell, 2002). Because, most land had been converted to grow crops for European countries, little land remained for native food production. In addition, Egyptian farmers had become dependent on western fertilizers to nourish their crops. With the worsening of the war, the supplies of foreign fertilizers were severely curtailed, and the supplies that got through were reserved for western agricultural interests. As a result native farmers faced severely diminished harvests that led to a nationwide famine.

The final consequence of fertilizer that Mitchell proposes is the previously mentioned concentration of workers caused by the expansion of the sugar industry (Mitchell, 2002). Mass production of cash crops, was only sustainable because of synthetic compounds, and the western method of agriculture replaced the traditional family farm system. With an increased mosquito population, a malnourished human population and new concentrated plantation settlements, the malaria epidemic took a strong hold in Egypt.

While the story of Egypt seems remarkable, the country was not alone as a victim to the introduction of new diseases. During and after the war, malaria spread to previously unaffected areas of the South Pacific and South America. While actions of the English were deplorable, the British neocolonial interventions in Egypt were representative of a widespread western philosophy. Despite the post-war deterioration of colonial empires, Italy, France, Germany, and the United States exploited the resulting developing nations claiming them as “spheres of influence.” As a result these struggling nations were further

exploited for war resources and cheap production. The case of Egypt simply illustrates the far-reaching social and health implications of such exploitation.

4.2 Echoes of the Cold War

With the end of World War II, the international political arena underwent several drastic changes that altered the nature of health initiatives worldwide, and malaria initiatives in particular. First, after the failure of the League of Nations, states saw the need for strong intergovernmental organizations (IGOs) and came together to form multilateral groups such as the United Nations. This shifted political trends away from the networks of state-to-state alliances that had previously dominated the diplomatic world. Second, the post-war era saw the rise of two main hegemons, the United States of America, and the Union of Socialist Soviet Republics, whose struggle for dominance colored most global initiatives thereafter. With the start of the Cold War these nations came to dominate the international political scene with their respective ideologies, making previously benign issues such as health, into arenas in their battle for superiority. Foreign aid and development became opportunities for the most benevolent ideology to "win." However this battle to be the most benevolent power polarized humanitarian work, moving away from the universal approach of the Rockefeller Foundation and toward an aid distribution system controlled by a select few nations. This US - USSR competition continued through the end of the Cold War. However, while some of the developments of the Cold War dissipated with the collapse of the Soviet Union, many of the trends set into motion during

this time continued through to this day impeding the progress of comprehensive global health initiatives.

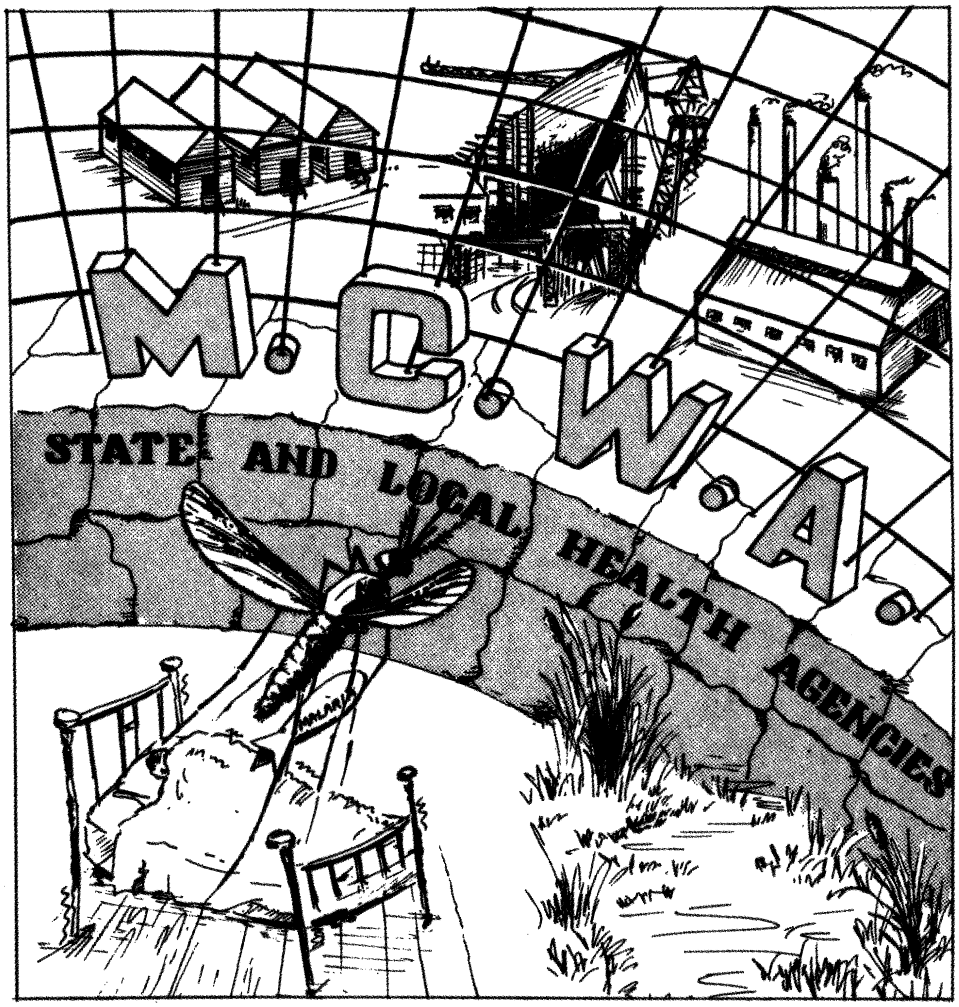
4.2.1 The Rise of International Organizations and the Cold War Politicization of Public Health Initiatives

While at the start of the Cold War, Americans supported Rockefeller Foundation style comprehensive, philanthropic programs, but as the conflict progressed, this support diminished and was replaced by a move toward strategic aid intended for specific political goals. This shift was motivated in part by the domestic "red scare" and by a desire to gain an edge in the conflict between Communism and Capitalism.

Immediately following World War II, American domestic opinion still held closely to the ideals of the Rockefeller Foundation. At the time, the Rockefeller Foundation was the only organization pursuing international health programs (Cueto, 2007). With its motto seeking "the betterment of mankind throughout the world," the Foundation represented philanthropic altruism of an unprecedented scale (Shaplen, 1964, p 21). For the five years following the war, Americans continued to benefit from this altruism, as the IHD of the Foundation pursued its eradication campaigns in North America. After the adoption of DDT during the war, however, cases of malaria had drastically dropped, and by 1953 malaria as almost disappeared from the American south.

The near eradication malaria did not stem Americans concern about a global eradication program, however. Rather, they remained committed to the idea for two reasons. First, with American troops stationed across the world, there was a fear that

infected soldiers returning home could bring with them enough malaria cases to restart the epidemic (Harrison 1978; Cueto, 2007). This fueled the continued support of foreign programs as a matter of national security. As seen in Figure 4.1 preventing malaria was



M.C.W.A. IS THE SUPERSTRUCTURE BUILT UPON THE SOLID FOUNDATION OF STATE AND LOCAL HEALTH AGENCIES FOR THE PROTECTION OF FIGHTING MEN AND WAR WORKERS.

This cartoon, from the Malaria Control in War Areas report for 1942–1943 (p. 5), depicts the mosquito as an enemy airplane carrying a disease "bomb." Here the emphasis is on the separation of the mosquito from barracks, ships, and industry.

Figure 4.1 Malaria Control in War Areas - a wartime malarial campaign poster

given serious treatment as a war measure (Humphreys, 1996). The US army even published an informational pamphlet illustrated by Dr. Suess to stress the significance of malaria to GIs stationed abroad (see Figure 4.2) (Leaf, 1943).

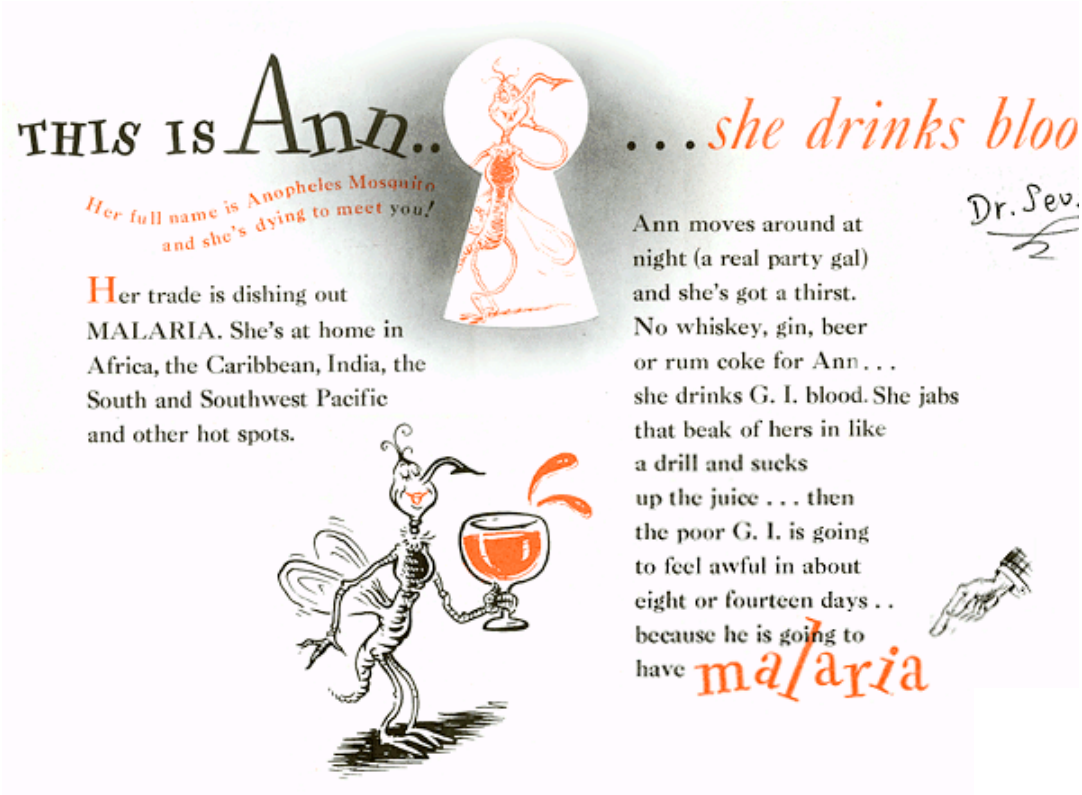


Figure 4.2 An Excerpt from Dr. Seuss's Informational GI Anti-malarial Comic *This is Ann.* (text by Munro Leaf)

The second reason for American post-war support of anti-malarial campaigns was the thought that malaria prevented productiveness and therein could spark another global economic depression (Litsios, 1996; Packard, 1997). The wartime production boom had buoyed the previously flailing American economy, and Americans know only a steady supply of raw materials could support domestic production. George Marshall, creator of the *Marshall Plan* once stated, "The conquest of diseases which hold millions weak and

inefficient... are tremendously important requirements of the world situation... tropical regions... produce large quantities large quantities of materials required by the industrial areas of the temperate regions (Packard, 1997, p 97)." Marshall is simply one of many State Department officials who stressed the connection between public health and prodctivity as a way to prevent another economic recession. Economist C.E. Winslow also pointed out that with a "large population of invalids crippled by preventable disease, it is difficult to see how one can seriously question the importance of the contribution of public health to global prosperity (Packard, 1997, p 98)."

This belief that health and productivity were interconnected, was also seen as a key in the conflict between Communism and Capitalism (Packard, 1997; Litsios, 1996). Disintegrating colonial networks gave ample places for the US and USSR to try and expand their "spheres of influence." Health campaigns were seen as a way to make wide-spread contact with the populations of these new developing nations. Public health campaigns were integrated into the Eisenhower administration's involvement in Thailand, Vietnam etc. For example, DDT house spraying teams in India were the only officials to come in regular contact with rural areas. As James Simmons, Dean of the Harvard School of Public Health stated in 1950, "The health and manpower of the free nations of the world are now the most vital resources in our fight against Communism (Packard, 1997, p. 98)."

Public health was incorporated into US Cold War foreign policy in more ways than one. John Foster Dulles, the strong-willed Secretary of State under President Eisenhower, strove to integrate US Cold War policy into all areas of foreign policy, including aid

organizations (Cueto, 2007). Dulles saw fields like public health as arenas where the expansion of capitalist interest and Cold War disputes could play out. For example, under Dulles, the State Department used the nascent Bureau of International Organization Affairs (BIOA) to monitor and influence the actions of UN subcommittees like the World Health Organization (WHO) and the Food and Agriculture Organization (FAO). The BIOA made sure that as the largest financial contributor, US interests were not compromised in WHO actions.

The actions of Dulles were not unusual in the post war political climate. Only a few years prior, the Truman administration used American financial clout to control the actions of the United Nations Relief and Rehabilitation Administration (Litsios, 1996). The United States contributed 75% of UNRRA's financial endowment, and as such, Truman felt they deserved the right to unilaterally make decisions regarding the distribution of aid. As Cold War tensions mounted, the administration decided to "distribute the benefits of its economic power to maximize political influence rather than suffer the dissipation of its power in an international association (Paterson, 1992, p. 112)." Sympathy with American ideals became a central requirements of receiving aid, and Eastern block nations were pointedly excluded from UN aid allotments (Litsios, 1996). Truman's term saw the implementation of many other similar policies including the well know Marshall Plan and Point Four program. New Deal era hero Fiorello LaGuardia cautioned strongly against the US government's new direction, warning "against the consequences if America tried to use its food and money as instruments of political

domination (Litsios, 1996, p. 269)." However, the power of international aid was too strong a weapon by which to achieve American political interests.

This move toward strategic aid was left unchallenged in part because of the climate of fear in the American public (Litsios, 1996;Packard, 1997). The Red Scare left politicians and activists alike threatened by the fear of being labeled a communist. As fears mounted, support for comprehensive aid programs waned, and only projects that support "American ideals" were seen as excusable expenses. Even domestic programs suffered from this change in public opinion. Previously extolled programs like the Tennessee Valley Authority became seen in a "reddish hue" and were claimed as "communist fronts," which seriously hampered the expansion of such programs (Litsios, 1996, p.271). With the scrutiny of domestic development programs, international programs faced even more severe skepticism. The only programs seen as justifiable were emergency aid progams for countries in crisis and some development programs intended to expand American "spheres of influence". This attitude continues to this day and is characteristic of a narrow "temporary solution" approach to healthcare.

The evolution of Cold War era public health initiatives was strongly influenced by the struggle between Communism and Capitalism. Though Americans initially were concerned for international public health in terms of protecting returning GI's and preventing future economic depression, these concerns soon gave way to a suspicion of non-strategic aid programs. The resulting trends may have started during the Cold War, but have become ingrained into American foreign policy. The politicization of aid

programs and a fear of being seen as un-American are just two of the many Cold War trends that have continued through today.

4.2.2 Continuities from the Cold War to Today

The Cold War may have ended over a decade ago, but the trends in international Public Health that it set in motion, continue to be evident. Most telling, are the parallels we see in the rhetoric surrounding the "War on Terror." Cold War anti-communist sentiments brought forth many similar concerns. As a result of these climates of fear, both of these time periods have seen: a politicization of developmental goals; an increased fragmentation of international health campaigns; a shift away from comprehensive programs and toward spot solutions for health emergencies; the adoption of policies that build dependancy not self-reliance in developing nations; and a "one-plan-fits-all" health strategy that trivializes regional social, economic, cultural and ecological differences.

The use of international aid to gain political clout may have begun during the Cold War, but the trend continues today (Litsios, 1996). Sanctions, holds on food aid, and a demonization of nations that do not follow these policies are scenarios that are common today. American politicians have extended their "with us or against us" policy to matters of international aid as well. Just as Truman's administration wanted sole control over the UNRRA's distribution of post war reconstruction aid, the American government believes that aid should only be distributed to allies in the "war on terror" (Litsios, 1996; Packard, 1997). The rhetoric surrounding this sentiment has not changed much in the past sixty years. For example in the 1950's the American director of the UN's Food and Agriculture

Organization described the US demands to control UNRRA funding as follows: " This movement.... will prove to be the most significant development in our lifetime. I believe it can effectively counteract the forces that work to undermine freedom and threaten world peace (Litsios, 1996, p. 269)." Similar connections between loving freedom, and limiting aid have been made in reference to the war on terror as well. By conjoining the issues of international aid and freedom, politicians can use economic leverage over developing nations to maintain their national interests.

Decreased support for international health aid that was sparked by the Red Scare caused a shift away from comprehensive anti-malarial campaigns favoring instead spot solutions to health crises (Litsios, 1996; Packard, 1997). This "emergency mode" stopped support for programs expanding primary care and health infrastructure. As a result, the general well-being of populations were ignored, leaving weakened populations ripe for epidemics. This shift toward selective health care often came under the guise of cost-effectiveness, however wide scale emergency measures and crisis control strategies are often far more expensive than maintaining basic levels of general health (Rosenberg, 2004). Randall Packard criticizes this approach pointing out that "define[ing] health as the absence of disease... ignore[s] a broad range of health problems (Packard, 1997, p.112)." Indeed, prophylactic approaches like supporting health education, food programs, and economic development could significantly curtail a community's susceptibility to disease in a cost efficient way.

This myopic view of overarching health problems, caused a fragmentation of health campaigns both during and after the Cold War. Not only were solutions focused around

specific health crises, they also were focused on more urban areas with existing infrastructure (Packard, 1997; Litsios, 1997; Tren &Bate, 2001; Needham, 2003). This method is especially ill suited for malarial campaigns, because they require regular contact with entire populations. Unlike smallpox campaigns of the past, which only required one visit to rural populations in order to administer a vaccine, anti-malarial campaigns require house sprayings, education campaigns regarding bed nets, administration of prophylactic medication, and other measures. While some believe this medical knowledge will trickle down from urban to rural regions within a country, the infrastructure of developing nations often makes this highly unlikely.

The education aspect of campaigns is especially imperative in rural regions (Needham, 2003). For example, in Mali, where annual malaria rates are at 150% (meaning the entire population experiences repeated infections every year), rural programs have been implemented through a collaboration between the government and foreign aid agencies. The government hires a few individuals from each community and trains them for several weeks in education campaigns and house spraying. These locals then return home to teach their peers about bed net use and ways to avoid mosquito ridden areas. They also carry out house sprayings with equipment supplied by the government and foreign aid agencies. While these efforts are time consuming, the end results are worth the cost. Neither mosquitoes nor parasites observe the boundary between urban and rural when infecting human victims, so containing the overall infected population is the only way to curtail burgeoning epidemics. But Mali is the exception, not the rule. Comprehensive urban-rural

programs are rare, and require a strong collaboration with the host government. When successful, however, these programs are highly effective.

Mali also provides an unusual example of how aid agencies can collaborate with a government to create self-sufficient public health programs (Litsios, 1996; Packard, 1997; Needham, 2003). Again they are the exception. Cold War methods of administering aid often ignored the potential contributions of host nations. Western nations often adopted a trustee mentality believing that developing nations faced health crises due to an inability to understand and address the problem themselves. This ideology continues to today, where western nations think money and technology alone can equip developing nations. Instead of making use of local information, and building local infrastructure to handle future crises, this method involved a unidirectional flow of money, technology, methods and manpower from developed to developing nations. As a result host nations were unable to develop their own public health infrastructure and remained dependent on western nations. Cynthia Needham discusses this phenomenon in her book *Global Disease Eradiation* saying, " malaria eradication programs are "Not something an international heath community can do *to* or *for* people. It can only be done *with* them... As long as malaria workers and local communities cooperated, it was possible to accomplish [eradication] (Needham, 2003, pp .22-21)." By equipping locals with the tools to continue anti-malarial programs, Mali set a trend in moving away from the Cold War "trustee" mentality.

The final trend that continues from Cold War public health policies is the adherence to one global anti-malarial strategy without considering regional social, economic, ecological and cultural differences. Needham describes this as a "one-plan-fits-all"

ideology (Needham, 2003, p27). For example, part of the US demands in unilaterally controlling UNRRA funding included dictating where and how the money was spent (Litsios, 1996). Similarly, once DDT became illegal in the United States, the US stipulated that no nations using DDT could receive aid (see Section 4.3). These kinds of mandates made up a western dictated anti-malarial strategy intended to apply to all nations.

This narrow focus regarding the costs and benefits of anti-malarial measures ignored fundamental differences between regions and limited the effectiveness of such campaigns. For example, Asia and Africa require very different methods of malaria control (Tren & Bate, 2001). Because Asia has smaller malarious regions, and a less virulent species of mosquito, vector control methods and even mosquito eradication measures can be effective. In Africa, however, the native *gambiae* species is both resilient and virulent, and populations are widely infected. Therefore, vector control methods are imperative, but cannot suffice to control the disease alone. Medication, and containment of infected populations are also necessary. Homogenous malaria control programs do not take these kinds of regional differences into consideration, and therefore waste resources in areas where alternative would be more cost efficient. Nowhere is this lack of regional sensitivity more apparent than in the case of DDT.

4.3 The DDT Double Standard

The case of DDT represents a clear example of how, in the current hegemon dominated system, developing nations are pressurized into adopting public health campaigns that take no consideration of their individual situations. Despite its invaluable

role in fighting malaria in the United States, DDT may be the most infamous synthetic chemical compound in the world. Demonized as one of history's largest enemies to the environment, DDT came to epitomize the danger of human interference with the balance of nature (Gladwell, 2001; Humphreys, 1996; Rosenberg, 2004; Williams, 1969). It is ironic, therefore, that up through the mid-century DDT was considered a miracle compound, seen as containing the solution to agriculture and health problems worldwide. Paul Muller, the Swiss scientist who discovered its pesticidal properties, won the Nobel Prize for his work, and DDT was touted as the solution to all insect ridden diseases. By using this compound, the United States and other nations were able to almost eradicate malaria from their populations, but once its adverse effects on wildlife were discovered, DDT fell out of favor with the Western world. Today, its is banned throughout much of the world. However, many believe that DDT symbolizes the double standard that the western world holds. Having already benefitted from widespread use of DDT, at the cost of the environment, western countries now hold developing nations to a standard that they can scarce afford.

4.3.1 Love and Hate: America's Varied History with DDT

Since the publishing of Rachel Carson's *Silent Spring* in 1962, DDT has become unquestioningly demonized throughout most of the world. As with many other issue trends originating in the West, anti-DDT policies and sentiments have trickled down to every level of the international community (Gladwell, 2001; Humphreys, 1996; Rosenberg, 2004; Williams, 1969; Harrison, 1978). What few people recognize, however, is that the

Figure 4.3 DDT is good for m-e-e-e! - A DDT Ad in Time Magazine

adverse effects of DDT in the environment, were a result of incredibly large-scale use in the United States. This was mostly a result of agricultural DDT use, where the chemical was used by the ton to coat large areas. Therefore, while the benefits of DDT use in fighting malaria were many, a far smaller amount of DDT could have been used to achieve the same objective.

DDT's use as a pesticide was discovered accidentally in 1941, by a Swiss chemist named Paul Muller (Gladwell, 2001; Humphreys, 1996; Williams, 1969; Harrison, 1978). Muller had been seeking a superior moth repellent when he discovered that even minute residual quantities of the compound could kill insects for long periods afterward. The promise of Muller's discovery centered around the fact that it seemed to have no adverse affects on humans. In fact, to this day no studies have proven any such adverse effects on human beings. Excitement over the new miracle compound spread, and by 1943 wide-scale production had begun. DDT was the longest lasting and least expensive pesticide in history with no human side effects. Many saw it as the answer to traditional agricultural and health problems.

Figure 4.4 A 1947 ad for "Kill-Coat" pesticide touting DDT's lasting qualities

What few realize is that in the fight against malaria, DDT was almost exclusively used to treat the inside walls of buildings (Gladwell, 2001; Humphreys, 1996; Tren & Bate, 2001; Williams, 1969; Harrison, 1978). In 1944, this process began in Italy, where Soper replaced pyrethrum building treatments with DDT house spraying. The process was resoundingly successful. Also, because the insides of home experienced such little exposure to the elements, there was almost no seepage into the environment, allowing DDT sprayings to last up to a year. This not only cut down drastically on the necessary manpower, it also struck a sharp blow to the population of infected mosquitos. Because mosquitos often rest on nearby surfaces after a blood meal, mosquitos that bit malaria patients in DDT treated homes had a far less likely chance of surviving to bite again. Reports of success in Sardinia and other parts of Italy were so glowing that by the end of the year many other nations including the United States began adopting DDT use. However, it is here that the story often becomes blurred.

Contrary to widely held belief, the overuse of DDT in America was not predominantly in public health, but in agriculture (Tren & Bate, 2001; Rosenberg, 2001; Humphreys, 1996). With the discovery of the worlds strongest pesticide, farmers began dispensing DDT by the ton. Crop dusters and irrigation system-like delivery methods sprayed unprecedented amounts of the compound into the environment. These methods made it impossible to stop DDT from washing into water sources and collecting in food chains. This excessive use of DDT lies in stark contrast to the few grams needed to spray the insides of a home. The latter is all that is needed for years of protection against

malarious mosquitos. As seen in Figure 4.3, DDT was heralded as a resource for better food and better health, but its overuse had serious consequences.

By 1962, and the start of the environmental movement, the effects of large amounts of DDT on birds and fish came into the public eye (Rosenberg, 2004; Tren & Bate, 2001; Williams, 1969; Harrison, 1978). The compound built up in their systems and could not be broken down. If exposed to large amount of DDT, birds and fish could die. Rachel Carson's book *Silent Spring* brought this to the public eye. At the time DDT was used almost exclusively in agriculture and for some household fumigation. With almost negligible levels of mosquito borne illnesses in the United States, however, the case for DDT was waning. By 1972, the nascent EPA had banned DDT use altogether.

The vilification of DDT in western society had vast impacts on developing nations. Once DDT was banned in the United States other nations and international organizations began to follow suit (Tren & Bate, 2001). Organizations like Greenpeace, the World Wildlife Federation, USAID, and the World Health Organization all added anti-pesticide clauses to their funding protocol. USAID in particular had to suddenly terminate many anti-malarial programs because of its policy to follow US domestic law in oversees ventures. Even in organizations without mandates connecting them to US policies, there were pressures to conform to the western standard. Soon the use of DDT became an assured way to lose foreign aid. As a result nations were forced to seek alternative, more expensive methods of Malaria control. However, this change did not go unchallenged. A global debate continues as to whether small amounts of DDT should be allowed in developing nations.

4.3.2 DDT in Current World Politics

When DDT became outlawed in western nations, it immediately fell out of favor in international aid organizations as well. There are two schools of thought regarding this trend. The first is represented by Rachel Carson and the environmental movement and has been widely adopted by most of the western world. The second point of view has gained momentum in recent years and believes that the issue of DDT should re-examined. This latter group purports several reasons for DDT to be given a second chance. First, they claim that if used in much smaller quantities, the potential benefits of DDT outweigh the negligible environmental costs. For example, most Americans remain unaware that no scientific study has ever documented any adverse effects of DDT on humans (Tren & Bate, 2001; Rosenberg, 2004). Instead DDT was banned for its effects on wildlife. Second, they contend that the current costs of DDT are a result of irresponsible overuse in the West, and represent a double standard of environmental responsibility. Third, they believe the cost-benefit value judgement that maligned DDT represents only a western view point, and does not take into consideration the value of human life in the third world. Finally they argue that DDT could be used in the short term to acutely address malarial epidemics. Then, once these epidemics are under control, DDT use could be discontinued.

In the current global debate, there is a strong argument for severely restricted use of DDT in specific health campaigns. As discussed in previous sections, the major source of DDT build up in the environment in the past, came from wide scale agricultural use.

Farmers used tons of the compound to coat every crop imaginable (Harrison, 1978; Williams, 1969; Humphreys, 1996; Webster, 2001; Rosenberg, 2004). In contrast, studies have been done illustrating the effectiveness of DDT house spraying that only requires a few hundred milligrams per house (Tren & Bate, 2001; Rosenberg, 2004). These sprayings last at least a year, if not longer, and have very little opportunity to enter the surrounding environment, as they coat only inside walls. Aside from being very long lasting, these house spraying are by far the cheapest available pesticide treatment, often costing less than a dollar per person per year (Rosenberg, 2004). Additionally they act as a highly efficient infection barrier by attacking mosquitos in the place where they are most likely to become infected: the home. In addition, by condoning DDT use only in the most severely affected regions, large scale environmental build up can be curtailed, while saving millions of lives.

The build up of DDT in the environment may have had significant consequence, but it did not happen over night. It took over thirty years of excessive use and the related environmental side effects for the West to acknowledge the dangers of DDT use, even though the effects of DDT on wildlife were known since its inception (Harrison, 1978; Berenbaum, 2005). As early as 1944, US public health officials warned of its deadly effect on fish and birds. However, it was not until the effects of mosquito borne illness were negligible in the West, and DDT was no longer needed to save lives, that the US government adopted a pro-environmental policy. Some view this change in policy as a double standard, advocating only those environmental policies that have no significant cost to the West. Indeed other current environmental debates support this view. For example, despite the extensive evidence regarding the dire consequences of large scale greenhouse

gas emissions, the United States refuses to accept the Kyoto protocol. Instead it remains one of the largest contributors of greenhouse gases. Many politicians claim that the adoption of such an agreement would be economically damaging to the US economy. As with DDT, the US holds a double standard of environmental responsibility, where it supports only those causes with no cost to itself.

Aside from the perceived double standard, many view DDT restrictions as an example of a western value system being unfairly forced upon developing nations (Litsios, 1997; Packard, 1997). Western based international organizations claim that the costs of DDT outweigh the benefits, but the nations that could most benefit from the anti-malarial use of DDT have no say in the assessment. In fact many African nations who restarted DDT programs in the 1990's were forced to stop for fear of losing their foreign public health funding (Tren & Bate, 2001; Rosenberg, 2004). International organizations claim "environmental sustainability" as their reason for DDT related restrictions, but as Tren and Bate ask in their analysis of the DDT question, "sustainability for whom (Tren & Bate, 2001, p. 61)?" The western definition of sustainability is a very narrow one. What about the sustainability of nations with over 100% malaria rates whose economies, education systems, food production, and infrastructure development suffer from the decreased productivity due to malaria (Litsios, 1997; Packard, 1997; Williams, 1978; Rosenberg, 2004)? What about the sustainability of the one out of every twenty children in the world who die of malaria every year? While the story of DDT is a sad one, it is but one example of the many ultimatums western nations attach to international health aid. Western values color the programs of supposedly "international" organizations such as the World Health

Organization, UNICEF, Oxfam, and the International Red Cross. Be it clinging to abstinence as a primary control of the AIDS epidemic, or denouncing cost effective malaria control methods, these organizations have moved far from the Rockefeller's region specific methods. Instead they rely on a "One Plan Fits-All" approach that groups all developing nations in one homogenous category. Ultimately it is a question of who should dictate the values for an entire region. Should it be those who have already benefitted from DDT? or those who can afford little else?

The final argument for DDT, supports DDT use only as a measure to gain control over severe epidemics. As in the American case, this reasoning holds that the costs of DDT are worthwhile in order to contain a malarial outbreak. Once the emergency stage of the epidemic is contained, they believe DDT use should be terminated. This idea is based on the real life cases of South Africa, Mexico and Brazil where DDT was successfully used to stem virulent outbreaks, and then replaced by alternative methods once the infected population diminished (Tren & Bate, 2001). The case of South Africa is especially telling because it employed this policy in the late 90's, after the WHO regulations went into place. The South African government intentionally forwent foreign funding, choosing instead to finance their own anti-malarial campaign which included limited DDT house spraying. Within a few years, cases dropped by 90%, and they had gained enough control over outbreaks to switch to a containment policy of prophylactic treatment and bed net distribution. This kind of policy is especially effective with regard to malaria because the disease life cycle depends on a large infect population to survive. By initially gaining control of the size of infected populations, the government no longer need worry about

eliminating the mosquito vector as strongly, and could re-instate DDT restrictions. It is especially important to note that none of these nations advocated DDT use in agriculture, but rather limited it for use in disease control.

It is unarguable that the costs of DDT are clear. If use in large quantities it can harm birds and fish and can generally disrupt local ecosystems. However, the issue of DDT represents a larger problem, the problem of human excess and its affect on the environment. By using moderation we could benefit a larger number of people with little additional risk. Though the costs are clear, the benefits of extremely limited DDT use merit renewed consideration. Moreover, it is imperative that we include the nations who suffer most from malarial outbreaks in this debate instead of coercing them to adhere to the values of other nations. Only by embarking on this kind of collaboration can we encourage true environmental responsibility while still effectively addressing the plights of impoverished populations.

Chapter V : Solutions For the Future

Unlike the Rockefeller Foundation's regionally-specific, host nation-conscious antimalarial campaigns, modern day health campaigns are based on western values instead of region specific conditions. Additionally these campaigns are variable with the political climate of the time. Nations could be showered with aid one day and completely cut off another day, based on their allegiances. This non-comprehensive method of executing campaigns has actually exacerbated epidemics by making nations reliant on foreign aid and them removing it, leaving partially completed campaigns that lead to worse health problems, and handicapping severely affected areas by withholding necessary resources. By closely studying past mistakes, however, public health officials can formulate effective plans for the future that avoid the pitfalls of days gone by. To effectively approach malaria containment today officials must: be cognizant of regional differences; build local primary care networks; establish education campaigns to increase the efficiency of existing measures; integrate host nation professionals into aid endeavors to build self -reliance; and institute local early detection and first attack programs to decrease the severity of epidemics.

Awareness of regional differences may be the most effective change that can be made to current anti-malarial campaigns. Organizations like the WHO, UNICEF and USAID have many blanket programs that do not effectively assess the needs of individual regions (Tren & Bate, 2001). For example, vector control is far more effective in Asia where eradication/control of mosquito populations is possible. Africa on the other hand,

with its the native virulent *gambiae* mosquito and large endemic populations have little hope for solely vector based control methods. Instead it requires a more comprehensive method which integrates prophylactic treatment and other containment methods such as bed nets. Similarly, some nations spend large amounts of money on pesticides and medicine with 80% failure rates because of international restrictions (Needham, 2003; Rosenberg, 2004). By assessing the cost-benefit ratio of alternatives, such as the reintroduction of DDT, these nations could vastly improve the efficiency of their antimalarial initiatives.

Another important change to adopt, is a focus on the establishment of comprehensive primary health care networks (Packard, 1997). As previously mentioned most anti-malarial campaigns have tended to focus around urban regions, where some health infrastructure exists. Mosquito populations are impervious to urban-rural boundaries, however, and this fragmentation of health campaigns leaves large portions of native populations untouched. By training a few locals in these rural regions, as they did in the Mali case (See Ch. IV), international aid organizations as well as host governments can access remote areas in a cost efficient way. This also builds the self-sufficiency of the host nation, while providing rural citizens with local contacts who they trust.

Education is especially important to comprehensive health initiatives. Unlike health campaigns of the past, which adopted a "trustee mentality" that underplayed developing nations ability to help themselves, todays health campaigns have begun to stress the education of local populations (Tren & Bate, 2001; Needham, 2003; ECA, 2004). However, while education is an important part of campaigns for diseases like AIDS, it is an

underutilized tool in anti-malarial campaigns. These campaigns not only have their own benefits, they can even increase the efficacy of existing measures (Rosenberg, 2004; Needham, 2003; ECA, 2004). For example, the African Union and the WHO collaborated with several countries in Africa to educate local populations about proper bed net use. By stressing guidelines like not going out after dark and putting children under bed nets immediately after dusk, these organizations were able to greatly increase the efficiency of bed net use. Regarding this particular endeavor, one WHO official noted "In places where people are not used to sleeping under nets, it is really very hard to make that change. Even if you bring the nets and make them available, you have a very intensive educational effort to undertake (Needham, 2003, p.36)." By respecting the ability of local populations to learn and change through establishing educational campaigns, we can expand the efficiency of both current and future health initiatives.

Also, by integrating local officials into foreign aid initiatives, aid agencies can encourage self-sufficiency in nations that have long been dependent on the West for their public health programs. Helping budding local health agencies become self-sufficient is the best way to wean developing nations away from unhealthy dependance (Needham, 2003; Rosenberg, 2004). For example, in Mozambique, WHO officials began training locals in house spraying techniques. The government and WHO collaborate to fund equipment, and local health employees do the rest. Not only does this build health infrastructure, but it also provides employment in rural areas. "It helps save on transport costs," says a Mozambique health official, "and the fact that sprayers come from the community makes it a lot more credible in terms of people accepting what is done in their

households (Rosenberg, 2004, p 7)." This kind of integrated initiative is growing, but is far from a being widely adopted. By helping developing nations to help themselves, we can move away from the harmful cycle of dependancy that has plagued them since colonial times.

Finally, establishing domestic early response networks can significantly curb the need for extreme measures like DDT use. The disease life cycle of malaria is highly dependent on a large, infected human population, so that mosquito vectors have a high chance of contamination (Williams, 1969). By controlling infected populations with bed nets and selective house spraying, aid agencies can limit the prevalence of the disease at low cost. Also, building infrastructure so that epidemics are reported early can lead to a cost effective way of distributing the necessary resources. For example, it is easier to administer a few doses early in an outbreak, than trying to orchestrate wide scale distribution during an epidemic. By integrating these improvements, aid agencies can increase the effectiveness of their campaigns, therein saving millions of lives.

Chapter VI
Conclusion: The Global Repercussions of Inaction

Current malarial epidemics are a result of centuries of interacting factors including residual colonial and Cold War trends along with a lack of adaptability in current anti-malarial strategies. Today, malaria provides a compelling example of how trends in international public health can leave millions of people suffering from devastating epidemics. After it was eradicated in the first world, support for malaria eradication programs became a political tool exploited by a few hegemonic powers. As a result, today's anti-malarial campaigns have become more emblematic than effective. Through inattention to regional differences, a politicization of international health aid allocation, the persistence of unhealthy 1st-3rd world patterns of dependance, and the narrow enforcement of western values on developing nations, the patterns of the past continue to hamper the success of anti-malarial campaigns today.

In an increasingly globalizing world, however the plight of people in distant communities can have profound effects on the rest of the world. The West must rekindle an interest in malaria for their own benefit and the benefit of citizens abroad. For example, with growing immigration and travel, widespread epidemics abroad can easily spread throughout the world. In the past ten years alone, cases of malaria have been found in California, New York, Texas, Virginia, and New Jersey (Needham, 2003). Frighteningly,

many of those cases were contracted locally, not during travel. Unless we address malaria abroad, we we never be free of it at home.

Similarly, by connecting health aid to political motivations, we frequently leave campaigns only partially executed. These partially completed eradication campaigns can lead to the rise of drug resistant strains of plasmodia, which threaten the entire global community. As seen in the spread of drug resistant TB, desultory health endeavors can be devastatingly harmful by allowing new strains to survive. To avoid this we must remain consistent in our efforts.

Finally, the international community must also consider the consequence of hampered development in highly infected regions. Malaria decreases productivity, education rates, infrastructure building, and many other aspects of life, central to the growth of developing nations. By not addressing the issue of malaria, we are losing the benefits that a growing third world would bring everyone. Education and economic growth in particular are strongly connected to political stability.

These are but a few of the potential consequences of inaction that illustrate the urgency of addressing current global malaria epidemics. In order to help ourselves and our neighbors, it is imperative that the global community alter the trends that have hampered the adoption of effective strategies for so long. In analyzing the historical sources of these trends, we have the ability to move away from the patterns of the past and toward a brighter future.

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