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## Public Health Implications of Tropical and Imported Diseases\*

Strategy against the Global Spread of Disease

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THIS is a public health war. In every theater, the fighting forces of the United Nations and the enemy alike are exposed to diseases of public health importance. In most of our combat areas, epidemic diseases are rife in the native population. Malaria encircles the globe, and is the foremost problem of military medicine in the majority of war theaters. Cholera prevails in India, China, and the Southwest Pacific; dysentery throughout the Tropics. In North Africa, the Near East, and Eastern Europe are the world's great reservoirs of louse-borne typhus. After an absence of many years, Germany acknowledges its presence there. Yellow fever is epidemic in Africa; it exists in jungle form in South America; and the mosquito vector thrives in the United States, the Mediterranean area, India, Burma, the Southwest Pacific. Dengue, borne by the same mosquito, occurs in the same regions. Every-

where in overseas fighting, we are confronted with venereal infections frequently pandemic, and with a high tuberculosis rate.

It is inevitable, therefore, that our fighting men are exposed to extraordinary disease hazards and that many will succumb. In every war of recorded time, disease has caused more military casualties than have battle wounds. This war is no exception.

Battle casualties cease when the fighting stops. Disease casualties continue to take their toll. In the three years after World War I, more people died of starvation and disease than were killed in the four years of fighting. Disease problems no less than the strictly military problems are unprecedented and infinitely complex in this global war. Consider, for example, the mass displacement of population—an estimated 12–15 millions of people in Europe—political and military prisoners, slave labor, and refugees. After the war, nothing will thwart the urge to go home. The more hunger, lowered resistance,

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and epidemics, the more uncontrollable the dispersion toward home. Foci of infection will thereby be scattered into the remotest villages throughout Europe. In this total war, health problems also are total in their nature, affecting total populations.

Our strategy against the spread of disease, therefore, must be global in its scope. It is being developed in three overlapping phases. The *first* is directed toward the protection of our troops and of vulnerable areas while the fighting is on. The *second* deals with the emergency restoration of health conditions in reoccupied zones, through relief of starvation and epidemic control—a prelude to rehabilitation. The *third* evolves into world-wide collaboration for improved health.

From the military point of view, our public health defenses at home, at outlying bases, and in combat zones must parallel military efficiency in the total job of defeating the enemy. The enemy faces the same disease threats to his striking power; therefore, superiority in health protection of our troops is as much a requirement for victory as superiority in forces and supplies. No other military force in the world approaches ours in the proportion or competence of its medical and health components. For this superiority we suffer gladly the privations necessary at home. Yet there is a limit beyond which excellence in military health service defeats its total purpose through deprivation on the production front. Medical and health services in many communities now are below the margin of safety, as you know.

The health of military personnel requires the strengthening of health measures in surrounding civilian areas. This is true abroad no less than at home. Since we are fighting in the tropics and subtropics on a vast scale, we must prevent insect vectors from being transferred to vulnerable areas

abroad, where they may hamper military operations, or to home areas where they can gain a foothold and disrupt war production.

Pestilence always has accompanied and followed in the wake of war. Every increase in the amount or speed of intercourse between nations has increased the threat of exotic disease. Air transport has leveled further the barriers of time and space against many epidemic diseases which hitherto have been successfully excluded from vulnerable areas. Much of our foreign air transport now traverses fever- and mosquito-ridden areas. Many air fields are little more than runways hacked out of the jungle, with no opportunity for sanitation. The native laborers are reservoirs of strange infection and the insects are pestilent. Under the pressure of war schedules or actual combat, sickness or an insect vector often becomes a stow-away to the next landing place. Such may have influenced the recent outbreak of dengue in Hawaii, and the recent introduction of the *Anopheles gambiae* and the tsetse fly from Africa into the Western Hemisphere.

As our fighting forces have been dispersed over wider and wider areas, we have seen more clearly the need to organize our defenses in depth to protect the battle front and the home front.

Our first-line defense is the combined effort of the United Nations to protect in so far as is possible their military forces from the health hazards of global warfare. Our second defense is the active and coordinated quarantine barriers being set up by the Army, the Navy, and the Public Health Service. Our own civilian health services constitute our deep defense on the home front. The last is supported by biological and environmental factors here at home which give us the opportunity of confining to local outbreaks any infection which may slip through the lines.

Joint research to forge sharper

weapons has been expanded by the Army, Navy, and Public Health Service as an essential part of our strategy. Against malaria, for example, our weapons are not good. The search for more effective antimalarial drugs is urgent from the military point of view, because environmental control is impossible under combat conditions. Our knowledge of such exotic diseases as filariasis, schistosomiasis, and the leishmaniases is incomplete. These and many other problems of military significance are under constant study.

Last December, the President created the United States of America Typhus Commission, composed of officers of the Army, Navy, Public Health Service, and outside experts, and authorized it to study typhus fever and recommend measures for its control in any area affecting military personnel of the United States. The commission is now working in Africa and the Near East, in preparation for the huge typhus problem which is inevitable when our forces get into eastern or southeastern Europe.

Early in 1943, an Interdepartmental Quarantine Commission was set up to review and recommend changes in current laws and practices designed to prevent wartime spread of disease into this country or between military bases abroad. The commission is composed of medical officers of the Public Health Service, the Army, and the Navy, under the chairmanship of Assistant Surgeon General Dunnahoo. The commission has already completed a preliminary survey of the transmission of disease and disease vectors as a result of military operations, air transport, or surface travel. They are continuing their studies on several lines of communication east and west, and at foreign bases.

We shall have to reorient our quarantine strategy with regard to air transport, since long-range, land-based

planes nowadays fly in from distant ports and land deep in the interior. We shall need to set up quarantine stations at inland airports where foreign traffic is heavy, as we already have done at the Washington Airport, now a world air center. As a further check on the rapid dispersion of infectious diseases through the interior, however, airports of entry should be located as near to the coast as possible.

International agreements limit national quarantine measures to the control of smallpox, typhus, plague, cholera, yellow fever, leprosy, anthrax, and psittacosis. Little can be gained from increasing the list, especially if thereby quarantine regulations should be used as a means of setting up trade barriers inimical to post-war economic reconstruction. The perennial problem of quarantine versus commerce is the same now as it was in 1881 when the Secretary of State, in opening the first international health conference held in the United States of America, referred to ". . . this conflict between permanent, free, and open intercourse of trade, . . . with this particular and pressing emergency of the public health." Quarantine, therefore, has been a sieve. It should not become a barrier in war or peace to necessary intercourse between nations. Its basic philosophy expressed in current military terms is that of "the calculated risk."

International barriers should not be set up against all infectious diseases. To do so would put into the hands of unscrupulous health officials punitive weapons against normal commerce. To overcome this tendency, there is general adherence to international conventions which limit quarantine jurisdiction to the most dangerous diseases. In this country we have successfully escaped imported epidemics of non-quarantinable diseases such as measles, dysentery, scarlet fever, and typhoid fever through good internal health de-

fenses, including the operation of interstate quarantine.

Circumstances of war may necessitate strengthening the federal interstate quarantine function, since the diseases which most concern the experts as potential post-war threats are not and should not be subject to national quarantine regulations. The Army and Navy may be relied upon not to release infected personnel until they have received the maximum benefit from modern treatment. However, some of the tropical diseases to which our troops have been exposed are not amenable to perfect medical control, and unpredictable relapses will occur.

Malaria is the outstanding example. Inevitably, malaria cases will be dispersed through the United States by returning troops. Local outbreaks are probable in parts of the country like the Upper Mississippi or the Hudson Valley, which have malaria mosquitoes, but which have been free from infection for many years. However, it is believed that history will repeat itself and that such outbreaks will die out, because, as in the past, the environment is not favorable to perpetuating the infection. But we should accelerate nature's process with mobile control forces to deal with outbreaks in any area. The triumvirate of modern malaria control is the physician, the engineer, and the entomologist. Equipped to analyze a situation from these three approaches, trained to organize effective control, these teams will be available to deal with any emergency outbreak, whether of malaria or other insect-borne disease.

Since the beginning of mobilization, the Public Health Service has maintained a mosquito-free zone around military and war industrial establishments in all malarious areas, building upon the work done during the depression years. As a total result, the Army experienced last year the lowest malaria rate in its history among troops

at home bases, although the bulk of them are in the South.

Yellow fever is a serious threat to all areas where the vector is present. The British, the Chinese, the Dutch are no less keenly aware than ourselves of the hazards to the Far East. Consider that one of our most important war air routes skirts areas in South America where yellow fever in the jungle form is endemic. It crosses tropical Africa, where yellow fever has been epidemic for years. And then the jump to India or on to China where teeming millions of people and the ubiquitous vector await only the virus to start a conflagration. One infected mosquito, one infectious case could light the fire of an epidemic far greater than those which flared in the United States during the last century.

Our troops are protected by improved vaccines, but it would be impossible to produce enough in time to protect whole civilian populations. There is not a port in the effective *Aedes* zone of the United States (below the southern boundary of Maryland) which is free of the yellow fever vector. We have begun control work at Miami, but we have a long way to go to equal the performance of Brazil where the yellow fever mosquito has been *eradicated* in every important port, and even in whole states.

As additional territory is conquered by our armed forces, urgent health problems will confront the occupying troops. Starvation and disease will be the two central facts. The control of epidemics will be a herculean task if the enemy wreaks the destruction in every city that he has done in Naples and on the Russian front.

For long months, intensive preparations have been made both by the military and by the Office of Foreign Relief and Rehabilitation to deal with anticipated problems. At the School for Military Government in Charlottes-

ville, for example, officers have been trained in problems of civil government, and the classes include a quota of Public Health Service officers, some of whom are now serving in Italy and North Africa.

Immediately after the OFRRO was created, Governor Lehman appointed a Health Advisory Committee composed of representatives from the government departments concerned and a few experts in international health problems. Coöperation was sought and gladly given by the Rockefeller Foundation and the Milbank Memorial Fund. All available epidemic and medical intelligence regarding each country has been pooled. Studies have been made of one country after another, embracing data on pre-war disease prevalence and distribution, sanitary and medical organization, number, size, and location of hospitals, health centers, laboratories, etc., the types of water supplies and methods of purification in each city, the estimated needs for medical and sanitary supplies, the number and location of camps for prisoners of war and political prisoners, the volume and nationality of slave labor, and estimates of the size and composition of the public health forces which will be needed.

When a country is reoccupied, there is an initial stage of military government. It may be assumed that as soon as the military situation permits, the government, while continuing under the general supervision of the theater commander, will be turned over to civilian auspices.

It has been announced that the United Nations and the nations associated with them in the war have been invited to sign an agreement in Washington on November 9, creating a United Nations Relief and Rehabilitation Administration. This will be the international agency through which public health control and other phases

of relief and rehabilitation will be carried on. In the proposed agreement, the second objective is to aid in the prevention of pestilence and in the recovery of the health of the people.

In any liberated country the basic policy will be to reconstruct the national health service as soon as possible. Outside aid obviously will be needed, but such aid will attempt from the beginning to work with and through the official national health departments and their local branches.

There has been joint planning between this country and other United Nations in connection with the problems of each occupied and enemy nation. In particular, representatives of the Inter-Allied Committee on Relief in London and our group on this side have exchanged full information concerning general plans. We have agreed upon standard lists and packages of medical and health supplies, and upon a procurement program to insure their availability. We have similarly agreed upon the size and composition of the public health and medical teams which will be needed. One unpredictable element in our planning is the future course of military events in a particular area—the amount of destruction and the further displacement of populations which will occur before final victory. It is gratifying to report that there is joint staff work and joint operational plans in the war against disease just as there is on global military strategy and operations.

Attention should be drawn also to the progress which has been made during the war in Pan American coöperation for stronger hemispheric health defense. This is being done through the Pan American Sanitary Bureau and through the Coördinator of Inter-American Affairs in coöperation with the health departments of the respective countries.

Of great importance, too, in future

global strategy against disease is the United Nations Organization on Food and Agriculture which will be set up following the recommendations of the Hot Springs Conference. In this organization, the improvement of human nutrition is a first objective. This international office of nutrition will be closely related on the one hand to health, and on the other, to agriculture.

Let me attempt to focus all I have said up to now and bring the several parts into relation with each other. We are faced with unprecedented health problems in this global war. On many sectors we have United Nations teamwork in dealing with wartime health problems. Further teamwork is assured especially in nutrition and in relief and rehabilitation.

But we need to look ahead a step further. We should begin now to plan with our allies a permanent international health organization ultimately to become world-wide in scope. After the war the needs for such an organization

will be greater than ever before. Air transportation will have broken down the barriers of time and distance. As a result of two world wars, we have learned that we cannot remain at peace with the rest of the world in flames. Similarly, I think, we cannot remain free from epidemic diseases if they rage in other lands. Moreover, improvement in health is the first step which needs to be assured in the backward nations if they are to attain a higher economic development.

International public health measures, therefore, should become the spearhead for peaceful international collaboration. Having learned to work and fight together to defeat the common enemy, we need equally to concert our efforts to the purposes of peace. The science of public health is the instrument through which much can be done to heal the wounds of war and to bring to mankind everywhere a new standard of healthful living which will surpass all previous human experience.