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U.S. Military Administration's Malaria Control Activities (1945-1948)*

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1. Introduction

How to evaluate the U.S. military administration is one of the most controversial themes in modern Korean history. The narrower topic of how to evaluate the health and medical services under the U.S. military administration also provides contentious issues. There have been several attempts to investigate the healthcare under the U.S. military administration

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as a movement of criticism and self-reflection on the fact that research on modern medical history in Korea thus far has been excessively focused on the opening port era and the Japanese colonial period. Evaluation of the healthcare services under the U.S. military administration is largely divided into two opposing opinions.

One school looks at the military administration's medical system rather negatively, arguing that the medical system centered on public healthcare during the Japanese colonial period was transformed to the American private healthcare system during this period under the U.S. military administration (Shin, 2000: 231). On the other hand, there are several positive viewpoints arguing that the health and medical system, which was controlled and functioned within a frame of police works during the Japanese colonial period, could eventually settle as an independent field during the U.S. military administration (Kim, 2011: 34). They regard the period as the one in which the public health system was able to be established based on a new concept. Despite such contradicting evaluations, they agree that the framework of the current Korean healthcare system was fundamentally built during the U.S. military administration.

The several studies that have been done on the medical system under the U.S. military administration thus far have mostly focused on the health and medical system and relevant policies along with leading figures during that period (Shin & Seo, 2013: 196-206). Regulations and policies deserve research priority in that they provide the most fundamental framework for a certain field's activities. However, the fact that a certain rule existed and whether it actually functioned well are two completely different matters. It is difficult to evaluate the actual situation only depending on the existence of a certain rule. Hence, it is necessary to show how a given problem

was actually solved by the existing regulation and organization or how they failed to do so, in order to clearly understand the actual situation surrounding the U.S. military administration's health and medical services. Accumulating the cases on the success and failure of such problem solving will enable us to decide whether the regulation and organization actually functioned effectively. So far, very little has been done concerning the control of a specific health problem under the U.S. military administration, and this is indeed what this paper attempts to address. This paper attempts to investigate the anti-malaria activities initiated by the U.S. military.

Here, a question might emerge regarding why malaria was chosen among a number of infectious diseases in this paper. One of the answers to this question is that it was the most widely spread disease at the time and hence the most problematic disease for army forces in battlefields. In fact, the greatest threat to the U.S. military in Japan and the Pacific region during the World War II was not the Japanese army but malaria. Hence, the U.S. military labored to prevent and control malaria throughout the war and, as a result, it accumulated a substantial amount of experience and knowledge on it. These experiences were extremely helpful in controlling malaria in the U.S. military's occupied territories such as Japan and Korea after the end of the war. Hence, the malaria case provides examples where the experience and knowledge accumulated during the war helped to solve subsequent health problems in the occupied territories.

Moreover, the usage of DDT is to be discussed here. DDT, which is one of the most problematic materials developed by human beings, began to spread broadly at the end of World War II. DDT used as a pesticide was effective not only in killing mosquitos that carry malaria, but also in killing a vector of another problematic disease, typhus. As such, the usage of DDT

dramatically changed the control of malaria. Hence, anti-malaria activities during the military administration will provide some cases that reveal how DDT was actually used.

2. Station of the U.S. Military and Establishment of Public Health System

The U.S. military stationed in South Korea after the end of the Second World War ran the military administration before the establishment of independent government in Korea. Due to the characteristics of the military administration, the maintenance of public order was given first priority, while the field of health and medical services received relatively little attention. However, the spread of various infectious diseases can cause social unrest and the diseases' prevalence in the field can also become contagious to the occupation forces of the U.S. military. Hence, it was necessary to build a health and medical services system that focuses on prevention of infectious diseases. For this purpose, knowing the current situation of the health and medical services in South Korea was a prior task.

The U.S. military, which was completely ignorant about the South Korean situation at the beginning of the stationing, first had to obtain information about the situation from local people. In addition to the simple collection of information, the help and participation from the locals were essential in future ruling. The term "locals" here not only refers to Koreans, but also includes Japanese who have been ruling Korea for the past 35 years. From a viewpoint of the U.S. military, who had to launch a new government by taking over the sovereign of South Korea, assistance from the Japanese who have been ruling the peninsula was critical, rather than support from

the Koreans who were being governed. In fact, the U.S. military initially attempted to make use of Japanese government officials in the military administration by leaving the organization of the Japanese Government General of Korea, but eventually gave up the plan due to Koreans' fierce resistance. In the field of health and medical services, the military government wished that the experienced Japanese doctors, scientists and laboratory operators would stay longer to train the Korean workforce for future services. However, the Korean sentiment could not allow it.[1)]

The U.S. military, who could no longer let the experienced Japanese government officials participate in the military administration, had to be satisfied with the Korean aid. The representative figure in the health and medical services sector that became a Korean partner to the U.S. military was Lee Yong-sul. Lee Yong-sul was the committee chairman of the Kon Kuk Medical Association founded right after the liberation, whose number-one task was to take over the organization of Japanese doctors and their hospitals. The committee also took care of the homecoming war victims from overseas. The military government who recognized such activities of the Kon Kuk Medical Association asked the association to nominate a candidate for sanitation advisor, and Lee who was the committee chairman at the time being was recommended. He acted as an advisor at the beginning and was named as a chief of the Bureau of Health and Welfare under the Military Government Office after its establishment. When the Bureau of Public Health and Welfare was raised to the status of Ministry, he was named the director of the Ministry of Public Health and Welfare on March 29th, 1946. He subsequently became the chief of the Bureau of

1) Public Health and Welfare, RG 332, USAFIK, XXIV Corps, G-2, Historical Section, USAMGIK, Box No. 20, p. 18-19.

Public Health and Welfare of the interim government on February 15th, 1947 and played a significant role in building the public health system until the establishment of the Korean government in August of 1948 (Yeo, 2012: 11). Even though several Koreans other than Lee Yong-sul such as Choi Chai Chang contributed to creating a framework of public health in the early phase of the military administration, most used to act as clinical doctors right before the liberation and had little experience or professional knowledge in public health. Because of this, some of them went to the U.S. to study public health supported by the military government (Choi, 1996: 172).

Building a general framework for public health was important, of course, but a problem that required a more urgent response was preventing the outbreak of infectious diseases and efficiently handling the already spread infectious diseases. The microbiologists Ki Yong-sook and Choi Young-tae were chosen by the Military Government Office as experts in preventions of infectious diseases. Ki Yong-sook, who used to conduct research on pest in Manchuria, was working as a clinical doctor at Daegu Dongsan Hospital after returning to Korea by the end of the Japanese colonial period. Choi Young-tae was a professor at Severance Hospital. Ki Yong-sook became the first director at the Chosŏn (Korea) Institute for Prevention of Infectious Diseases, which was established on September 24th, 1945, while Choi Young-tae was named as a director of the Bureau of Public Health and Welfare (Roh, 1998: 366). Both were the experts of preventing infectious diseases and they played active roles during the military administration and after the establishment of the Korean government. However, they had little opportunity to participate in the public health of the Japanese Government General of Korea during the colonial era and hence were

unable to provide the U.S. military with valuable information about the general disease situation in Korea.

As such, the U.S. military received assistance from the Japanese government officials or experts. Even though directly including them in the military administration was hard due to strong resistance from Koreans, the U.S. military could receive their reports regarding the general disease situation in Korea. The military government obtained prior knowledge about the disease situation in Korea through in-depth interviews with Kobayashi Harujiro (小林晴治郎), a professor at Keijo Imperial University and a renowned parasitologist and an authority on endemic research in Korea in addition to Japanese army surgeons. Based on the interview contents, the following two reports regarding the health situation in Korea were published: "Communicable Diseases in Korea" and "Preliminary Entomological Report." A summary of the papers was presented at the executive council held on September 15th, 1945.[2] The presentation pointed out that the overall health situation in Korea became worse nearing the end of the war due to the shortage of medicine, food, etc. and that the disease-related statistics were incomplete, as they only included the cases of hospital visits. The U.S. military decided that the statistics on infectious diseases during this period had little credibility after listening to the Japanese government officials' testimony stating that only 10-20% of the infectious disease patients were reported.[3] In particular, after 1942 toward the end of the war, even a cursory report system did not function well, further reducing the reliability of the statistics.

2) RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health & Welfare (6 of 7), p. 125.

3) Summation of Non-Military Activities in Japan and Korea, No. 2, 1945. 11.

As the first visible action to build an overall health and medical services system in South Korea including prevention of infectious diseases, the U.S. military established the Bureau of Public Health and Welfare following the military administration decree No.1 that was promulgated on September 24th, 1945.[4] This was a movement that fundamentally changed the previous philosophy and framework of sanitary administration, by separating sanitation work that used to be a part of the police work during the colonial era and founding an independent organization in charge of it.[5] This moved the responsibility for public health and quarantines from the police to the field of medicine. As a result, medical doctors were appointed to be in charge of the public health organization.

Meanwhile, during this transition, there was resistance from government officials who were steeped in old-school thought that public health and quarantines are police work. Even though Japanese government officials in key positions resigned following the military administration, junior-rank Korean government officials who worked under them remained and carried out the same roles. In this situation, as the military government appointed doctors equipped with professional medical knowledge to responsible seats in public health in succession, government officials in general administration, especially the local administration government officials including county chiefs, expressed substantial hostility against the appointment of doctors in executive government officials' position.[6]

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4) SCAP, Summation of Non-Military Activities in Japan and Korea for September-October 1945, Section 19, The first director of the Board of Health was Lieutenant Colonel Glenn W. McDonald.

5) Public Health and Welfare, RG 332, USAFIK, XXIV Corps, G-2, Historical Section, USAMGIK, Box No. 20, p. 1.

6) Public Health and Welfare, RG 332, USAFIK, XXIV Corps, G-2, Historical Section, USAMGIK, Box No. 20, p. 14.

In a context of the active usage of doctors, the reporting system of infectious disease outbreak also saw a huge change. During the colonial era, sanitary activities were done within a framework of public order and hence the main agent of the report was the general police instead of doctors. As such, policemen without professional knowledge on diseases confirmed and reported diseases, which inevitably reduced the medical accuracy of the reported diseases. The reason that the U.S. military could not rely on the disease statistics recorded during the colonial era was thus not only the high omission rate, but also because the checking and reporting of the infectious diseases were done by non-experts. Hence, the military government assigned an authority to confirm and report the diseases only to the doctors. It also made use of telephones to make the reporting more prompt.[7)]

What the military government took seriously along with the alignment of such a system was the manufacturing and securing of vaccines. The fact that the Chosŏn (Korea) Institute for Prevention of Infectious Diseases was newly established on the same day as the Bureau of Public Health and Welfare supports this. The Chosŏn (Korea) Institute for Prevention of Infectious Diseases, whose name was changed to the National Institute for Prevention of Infectious Diseases on February 19th, 1946, played a critical role in the military administration's sanitary activities. The core of the military government's sanitary activities was the prevention of infectious diseases by vaccinations, most of which came from the National Institute for Prevention of Infectious Diseases. Vaccinations are surely an indispensable part of anti-infection activities, but improvements in citizens'

7) Public Health and Welfare, RG 332, USAFIK, XXIV Corps, G-2, Historical Section, USAMGIK, Box No. 20, p. 23.

living environment are important as well. However, enhancing people's overall living environment takes time, and the military government might have focused on vaccinations that could deliver more direct and visible effects. Their stance appears in actual anti-infection activities.

As was suspected, various infectious diseases began to break out after the stationing of the U.S. military. On September 11th, 1945, an outbreak of 13 smallpox patients was reported in Youngdeungpo, Seoul.[8] Afterwards, smallpox spread nationwide to reach its peak in April of 1946, when the reported number of patients reached 19,809.[9] The military government conjectured that such a broad prevalence despite mandatory smallpox vaccinations during the Japanese colonial period was either due to a problem with the vaccines or due to the cursory vaccinations. Hence, the military government announced a plan to vaccinate every person in South Korea and mass-produced vaccines for 18 million people at the National Veterinary Laboratory in Busan to distribute nationwide.[10]

In addition to smallpox, cholera spread nationwide in 1946. In May of 1946, cholera broke out in Busan by a repatriator from China and began to spread throughout the country. Upon the outbreak of cholera, the military government initiated a vaccination against cholera on the whole nation south of the 38th parallel starting in July of 1946. For this, the National Institute for Prevention of Infectious Diseases produced 35,868,850 cc

8) Public Health Bureau activities for the week ending 10 November 1945. Headquarters United States Army Forces in Korea, Office of the Military Governor, Bureau of Public Health and Welfare.

9) Headquarters United States Army Military Government in Korea(HUSAMGIK), APO 235 Unit 2. History of the Department of Public Health and Welfare to May 1947.

10) Historical Summation, Department of Public Health and Welfare, September 1945 - May 1947, RG 407, Entry No. 368, Box no. 2066, p. 152.

of cholera vaccines during 1946.[11] However, this was not enough, and another 10,000,000 cc of vaccines was additionally imported from Japan. Cholera ceased no sooner than November of 1946, by which time a total of 15,642 patients were reported and 10,191 died.[12]

As such, we cannot say that the military government effectively responded to several infectious diseases in the early military administration era. However, in a politically chaotic circumstance right after the liberation and facing a shortage of available human and material resources, it must have been difficult for the military government that was in charge of ruling South Korea to instantly build an effective preventing system for infectious diseases while launching the military administration at the same time. Nevertheless, there was an infectious disease that received a relatively effective prevention. It is malaria whose debate comes hereafter.

3. The Pacific War and the U.S. Military's Malaria Experience

On August 15th, 1945, the U.S. military won the Pacific War following Japan's unconditional surrender and their stationing in Japan began. At nearly the same time as Japan's stationing, the MacArthur Headquarters published a 60-page booklet called, "*Military Control of Insect and Snail Borne Diseases.*"[13] This booklet is a manual that contains specific prevention and management methods of various insect-borne and snail-

11) 中央防役研究所, 『大韓民國 保健社會部 中央防役研究所 要覽』第2號, (서울: 大旺印刷所, 1955), pp. 30-31.

12) Historical Summation, Department of Public Health and Welfare, September 1945 - May 1947, RG 407, Entry No. 368, Box no. 2066, p. 153.

13) Preventive Medicine Manual for all officers No. 2, *Military Control of Insect and Snail Borne Diseases*, Malaria and Insect-Borne Disease Control, United States Army Forces, Pacific, August, 1945.

borne diseases, e.g., schistosomiasis, which could threaten the health of the U.S. military in their new stationing place of Japan. The insect-borne diseases here mainly refer to diseases that are carried by mosquitos, e.g., malaria and encephalitis. The exact publishing date is not clear. It only bears a sign "August 1945," while the preface by MacArthur is dated August 20th, 1945. That is, the booklet was published at the same time as the stationing in Japan. It is dubious how a booklet with such detailed contents could be made in such a short period of time. Of course, it can be surmised that the U.S. military prepared in advance, predicting the future Japan stationing. However, it can also be conjectured that the publication of the booklet in such a short amount of time was possible due to the U.S. military's sufficiently accumulated experience regarding insect-borne diseases.

In fact, there are several mosquito-borne severe diseases on the U.S. mainland. One of the representative diseases is the well-known yellow fever. Malaria was as problematic as yellow fever in America. Malaria broke out in southern states such as Mississippi and Missouri, and such states had difficulties in securing army forces during the First World War.[14] Moreover, malaria's place of origin began to expand in 1935, and the U.S. government initiated a serious domestic malaria management project in 1941.[15] The malaria management project involving the extermination of the vector insects, mosquitos, in the U.S. was different from the tasks that the U.S. military would later perform overseas, both in its contents and methods. In other words, the situation surrounding the outbreaks of

14) The Medical Department of the United States Army, *Preventive Medicine in World War II, vol. II. Environmental Hygiene*, (Office of the Surgeon General Department of the Army, 1955), p. 183.

15) *ibid.*, p. 184.

the malaria on the battlefield in the Pacific region and the one within the U.S. differed, demanding varying responses. Until the adaptation to new environment, the U.S. military had to make substantial sacrifices.

The U.S. military that entered the Pacific War faced a huge enemy in malaria. The number of U.S. military casualties due to malaria exceeded all battle casualties by more than five times in the South Pacific region. In the Battle of Bataan that took place in the Philippines in 1942, the malaria infection rate in the U.S. military was 85%, resulting in a severe loss of fighting power, and as a result, the U.S. military could not help but to hand over the Philippines to Japan. Moreover, during the Guadalcanal Battle in the Solomon Islands, many soldiers were sent to the rear due to malaria and the U.S. military had to struggle waiting for them to recover, suffering from a lack of fighting power. The situation was not different in New Guinea. It was no exaggeration to say that malaria was an even greater enemy than Japan for the U.S. military in the Pacific War. The supply of quinine medicine was insufficient and Atabrine was not yet widely used. There was no device or medicine that could be conveniently and effectively used for mosquito extermination.[16] However, the U.S. military, who had bitter experiences from malaria, paid a great amount of attention on the prevention and management of malaria afterward. As a result, the U.S. military could accumulate substantial knowledge on malaria and could be equipped with an experienced professional workforce and organization that could properly control it by the end of the Pacific War.

There were two types of organizations within the U.S. military that were

16) Preventive Medicine Manual for all officers No. 2, *Military Control of Insect and Snail Borne Diseases, Malaria and Insect-Borne Disease Control*, United States Army Forces, Pacific, August, 1945. pp. 2-3.

in charge of malaria, i.e., the Malaria Control Detachments and Malaria Survey Units, and their roles were differentiated. First, the primary purpose of the Malaria Survey Units was to investigate the current situation. That is, it first understood the malaria infection degree through field research, accurately defined mosquito species that carry malaria, confirmed outbreak spots of mosquitos, and proposed the most efficient management plan based on this information. Next, the Malaria Control Detachments conducted actual management work following the proposal. As for the basic human structure, each Malaria Survey Unit consisted of 14 and each Malaria Control Group of 11 individuals. The numbers were not fixed, and the number of members changed according to the local circumstances. The Malaria Survey Units were aware of mosquitos' habits, and the members included entomologists or parasitology experts with professional knowledge who could accurately define the mosquito species. Meanwhile, the Malaria Control Groups mainly consisted of sanitary engineering experts who could build drains or fill in puddles, with the purpose of restricting mosquitos' outbreaks. Moreover, the Malaria Control Groups were equipped with heavy machines such as tractors and bulldozers for these works. In order to be a member of these two organizations, applicants had to obtain a total of 192 hours of education, 48 hours a week for four weeks. In 1945 right before the end of World War II, there were 161 Malaria Control Groups and 76 Malaria Survey Units currently working. Most of them functioned near the Pacific region.[17] Hence, when the Pacific War ended, the U.S. military was already equipped with accumulated knowledge, human resources, and

17) The Medical Department of the United States Army, *Preventive Medicine in World War II, vol. II. Environmental Hygiene*, pp. 206-215. Office of the Surgeon General Department of the Army, 1955.

organizations that could effectively manage malaria, which differed from the early stage of the war. Moreover, by the end of the war, DDT, which was the strongest pesticide ever, was invented to be used for mosquito control, making malaria management easier. The result of these experiences can be seen in the prompt writing and publishing of the booklet for the control of insect-borne diseases including malaria in parallel with the U.S. military's stationing in Japan, as mentioned at the beginning of this chapter. Hence, the U.S. military who began to be stationed in Japan and Korea right after the end of the war could more effectively respond to malaria or other insect-borne diseases than any other infectious diseases.

4. Research on the Malaria situation in South Korea

In March of 1946, the U.S. military army surgeon stationed in Japan and civilian experts gathered in Tokyo to have a series of meetings, debating on how effectively exterminate mosquito during the first summer after occupying Japan.[18] The focus of the meeting was on how to exterminate mosquitos carrying encephalitis, which was regarded as the most threating disease to the stationed U.S. military. As the meeting unfolded, a number of questions arose, such as where the Japanese mosquitos, including those carrying encephalitis, usually propagated, the seasonal variation, and what kinds of blood sucking habits they had. Through this, they realized that they lacked the knowledge required for effective extermination. Hence, the U.S. military conducted extensive research on the types, propagation environments, habits, etc. of mosquitos inhabiting every region in Japan

18) *Mosquito Fauna of Japan and Korea*, Office of the Surgeon HQ. 8th Army APO 343. Prepared by 207th Malaria Survey Detachment APO 301. p. 1.

over the following four years and summarized them in a report. The primary subject of this survey report was Japanese mosquitos, but the contents contain some information regarding mosquitos in Korea.

A task force that directed this survey, the "207th Malaria Survey Detachment," came to Korea in the fall of 1946 and the fall of 1947 to conduct an analysis on the mosquitos inhabiting Korea.[19] Meanwhile, this was not the first time that the U.S. military analyzed mosquitos in Korea. On September 8th, 1945, right after the liberation, the "601st Malaria Survey Detachment" came from Japan to Seoul via Incheon. Entering Seoul, they collected mosquitos from diverse regions of mosquito outbreaks and determined species starting on September 10th for the purpose of obtaining information about the mosquitos inhabiting Korea.[20] These survey results were summarized in the previously mentioned report. According to this report, there were a total of 23 mosquito species inhabiting Korea including "*Anopheles sinensis*," which is a representative mosquito that carries malaria. All except for three were commonly observed in Japan.[21]

Conducting surveys on the vector insects, mosquitos, was the most fundamental task for understanding the malaria situation in South Korea. Actually, understanding how many malaria patients exist at the moment or how many there were in the past was important as well. The primary reference was the malaria-related statistics recorded during the colonial

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19) *ibid.*, p. 54.

20) Unit History, 601st Malaria Survey Detachment, RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health & Welfare (6 of 7). p. 77.

21) *Mosquito Fauna of Japan and Korea*, Office of the Surgeon HQ. 8th Army APO 343. Prepared by 207th Malaria Survey Detachment APO 301. p. 55. The species *Anopheles pillus, Aedes chemulpoensis, Aedes seoulensis* were reported to be found only in Korea.

era. However, this also had low credibility, like other disease statistics for the same reason as mentioned before. Moreover, malaria was not even a legal infectious disease during the colonial era and hence the statistics were rarely accurate. Nevertheless, the U.S. military could not help but refer to these incomplete statistics. They grasped the Korean malaria situation using the Japanese survey data during the colonial era. The statistics referred by the U.S. military were from 1935. The U.S. military quoted a report that argued that even though the malaria outbreak in Korea is mostly tertian malaria, there are some falciparum malaria cases resulting from infection via needles in the case of drug addicts.[22)]

In order to complement the previously incomplete statistics, consultations with experts were also underway. The military government listened to the report on the overall malaria situation and characteristics in Korea from Kobayashi Harujiro who was a professor at Keijo Imperial University and a renowned parasitologist. His explanation is summarized next. In Korea, malaria was especially prevalent in southern areas, and there were few fatal cases, as the symptoms were not so severe. Moreover, vector insects were mainly "*Anopheles hyrcanus sinensis*," which usually propagated in rice paddies or puddled. The characteristics of the malaria outbreak in Korea were that it peaked in June and July right before August when the number of mosquitos soared. Professor Kobayashi surmised that the malaria outbreak would continue until the late summer through the latent period, similar to other regions.[23)] Even though the military learned about

22) TB MED 208, War Department Technical Bulletin, *Medical and Sanitary Data on Korea*, p. 36, Dec 1945.

23) RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health & Welfare (6 of 7), p. 126.

the general characteristics of the malaria outbreak in Korea reported by Professor Kobayashi, they could not obtain accurate statistics. However, they could secure incidence statistics for troops, which were relatively accurate compared to the civilians' incidence statistics that were largely incomplete. According to statistics by the Japanese army, the number of malaria patients in the Japanese army over the course of eight months in 1945 until the Japanese surrender in August was 1,647.[24)]

The military government, who understood the malaria situation in South Korea to a certain extent through previous statistics and expert interviews, initiated a direct survey on civilians' malaria infection rate. On September 19th, the previously mentioned "601 Malaria Survey Detachment" conducted blood tests on about 500 elementary school students in Seoul as a sample for malaria protozoan confirmation along with examinations of mosquitos. It subsequently conducted identical tests on elementary school students in other regions such as Songdo and Iri. According to the results, *plasmodium vivax* was confirmed in approximately 4% of the children with a minor difference between each school (Table 1).[25)]

24) General Condition of Health and Welfare, 13 December 1945, Headquarters XXIV Corps Office of the Surgeon APO 235. RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health & Welfare (6 of 7). p. 128.

25) Essential Technical Medical Data, 15 December 1945. Headquarters XXIV Corps Office of the Surgeon APO 235, RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health & Welfare (6 of 7). p. 114.

Table 1. Result of Blood Smear Test for Primary School Students in Seoul

Name of School	No. of Children Examined	No. of Positive	Percent
Songdo	99	2	2.0
Sobbingo	80	1	1.3
Hallnam	75	3	4.0
Hyoje-dong	72	1	1.3
Tschung-ke	75	1	1.3
Mapodong	75	3	4.0
Sogdong	75	6	8.0

(USAFIK, 1945: 114)

It was not easy to conduct a nationwide survey that confirms infection through direct blood smear and hence there are no accurate statistics regarding this. Nevertheless, the authorities presumed that approximately 20% of the residents in southern rural areas were infected with malaria and that approximately one million patients experienced an outbreak nationwide each year (Chu, 1951: 92). Statistical data partially exist in Jeollabuk-do, Chungcheongnam-do, and Gyeongsangbuk-do, and Gyeongsangbuk-do had a significantly higher incidence compared to other regions. Because of this, Gyeongsangbuk-do was under special management when the malaria eradication project supported by the WHO began in the late 1950s.

Table 2. Reported Malaria Cases in 1947 and 1948

Provinces	1947	1948	Total
Jeollabuk-do	22,526	2,400	24,926
Chungcheongnam-do	22,490	-	22,490
Gyeongsangbuk-do	-	68,214	68,214
Above three provinces	45,016	70,614	115,630
Other provinces	4,169	450	
Total	94,201	141,678	235,879

(Chu, 1951: 92)

As shown above, the military government seems to have had substantial interest in malaria control and attempted management from the early stationing in South Korea. This can be quite surprising considering the fact that the malaria that broke out in South Korea was not as fatal as the outbreak that the U.S. military experienced in the South Sea Islands. It was much milder. The reason malaria was not designated as a legal infectious disease during the colonial era despite large number of malaria outbreaks is surmised to be the mild nature of Korean malaria. Nevertheless, even though Korean malaria was not as fatal as other infectious diseases, malaria was the most common disease for the U.S. military stationed in Korea. Actually, in terms of the nationwide prevalence of other infectious diseases such as cholera and typhus, there were few cases in the U.S. military. On the contrary, there was an endless stream of malaria patients within the troops throughout the summer even though a series of actions were taken, including DDT spray and mosquito repellent incense (Chu, 1952: 3). Moreover, although tertian malaria is not fatal, it substantially diminishes infected individuals' activity. In case of high malaria infection rate, the overall activity level of the group will dwindle, and hence the disease should never be overlooked. In that sense, malaria was a particularly important disease from an economic point of view. In Korea, which was an agricultural nation at the time, malaria patient outbreaks were focused on the busy season for farmers, i.e., from June to August. The labor loss due to malaria was serious, and it reduced agricultural productivity. Hence, malaria was a significant disease not only from the viewpoint of civilians' public health, but also from an economic perspective (Choi, 1949: 37).

5. DDT and Malaria Control

Malaria control is conducted in two ways. The first is by administering medicine to infected individuals, and the second is by controlling vector insects, i.e., mosquitos. Even though controlling mosquitos is the more fundamental measure, it is nearly impossible to thoroughly prevent mosquito outbreaks due to mosquitos' broad range of origin locales. Hence, it has been common to focus on medicinal administrations. Actually, malaria management during the colonial era was also confined to quinine administrations to patients. The necessity for mosquito control was surely broached at the time, but mosquito control remained a mere principle due to its practical difficulty (Yeo, 2011: 72).

The development of DDT as a pesticide fundamentally changed the pessimism on mosquito control. Although DDT was initially synthesized in 1874, its effectiveness as a pesticide was found no sooner than 1939. DDT came into the spotlight as its effects on controlling mosquitos that carry malaria, which was most problematic during the Second World War, and on others lice that carry typhus fever were confirmed (Kinkela, 2011: 20). DDT possesses strong insecticidal effects and long residual effects while having been believed harmless to the human body or environment, all of which made DDT a miracle pesticide.

The spray of DDT can be largely divided into two ways. The first is to dust powder, which is usually used for the control of lice and fleas that carry typhus fever. The powder is directly perfused on clothing or blankets that vector insects mainly inhabit or on a person's hair or inside the sleeves, collars, underwear, etc. Sometimes it is perfused inside pants by loosening the belt. A 5% DDT solution made by diluting DDT powder

in diesel oil or paraffin can also be sprayed. This is a method commonly used for controlling mosquitos and flies, and it is used to control vermin in houses where people reside or inside buildings. Spray is done on every inside surface where mosquitos or fly can sit, including walls, ceilings, chairs, tables, closets, etc. This maximizes the advantage of DDT, i.e., long residual effects, and the effects last for about three months after spray as long as it is not intentionally washed out.[26)]

Even though it is unknown exactly when DDT was first used in Korea, it is conjectured to be right after the U.S. military's stationing in South Korea. DDT spray was not regularly done. According to the rule, a temporary spray team consisting of approximately 20 people was organized right before the spray season to perform tasks and was dismissed afterward. Considering the nature of the work, spray teams were mainly composed of malaria control and survey detachments. In the case of South Korea, the "179th Malaria Control Detachment" was in charge of mixing and supplying various pesticides in the field. Moreover, these people mainly organized a temporary spray team and they disinfected buildings in downtown Seoul that were once occupied by the Japanese so that people could use them. It is likely that DDT was first used by these people in South Korea.[27)]

On September 26th, 1945, DDT solution was sprayed from the sky in Seoul for the first time.[28)] This was done to prevent the outbreak of diseases

26) Preventive Medicine Manual for all officers No. 2, *Military Control of Insect and Snail Borne Diseases, Malaria and Insect-Borne Disease Control*, United States Army Forces, Pacific, August, 1945. pp. 56-59.

27) RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health & Welfare (6 of 7). p. 77.

28) Public Health and Welfare, RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health

that are carried by flies and mosquitos. Starting from November, DDT residual spray was done once a month on trains, buses, trams, jails, school, factories, etc.[29] DDT spray was performed in refugee camps and clinics every other month. Since the repatriators from the North were highly likely to possess carriers of typhus fever, Seoul where they gathered, deserved special attention. Therefore, vaccination, along with DDT dusting, was performed on residents in seven regions that were thought to have an especially high risk.[30]

DDT spray was concentrated in urban areas such as Seoul, especially the residential area of the U.S. military. This was primarily done to prevent a mosquito outbreak in the U.S. military's stationing regions, but broader regions surrounding the troops also required spray, as malaria could not be prevented only by managing the barracks due to the mobility of mosquitos. Hence, paraffin, diesel oil, etc. were perfused along with DDT in the U.S. military's stationing regions or cities in order to extensively get rid of mosquitos.[31] The extermination of mosquitos through DDT spray where the U.S. military was stationed was led by the U.S. military, but other cities needed Koreans to play such a role. In addition, an educational program was also underway encouraging people to avoid mosquito outbreaks inside their homes and to be careful not to be bitten by mosquitos during a night out. Examining how the malaria control program unfolded by looking at the Chungcheongbuk-do case, a task force sprayed DDT and paraffin

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& Welfare (4 of 7). p. 153.

29) Medical History (1 October 1945 to 31 December 1945), Headquarters XXIV Corps Office of the Surgeon, APO 235. p. 100. .

30) Headquarters United States Army Forces in Korea, Office of the Military Governor, Bureau of Public Health and Welfare, Public Health Bureau Activities for the Week ending 10 November 1945. USAMGIK Box 19, p. 80.

31) USAMGK, part III, p. 89.

all over downtown once a month, disinfected the insides of houses, and ran the educational program that encourages people to be careful not to be bitten by mosquito at night.[32] DDT was distributed to pharmacies throughout Korea to be sold[33] and even to households for free.[34] From time to time disinfection activities ran into trouble depending on the DDT supply situation. In the summer of 1948, the DDT supply shortage was so severe that the malaria management project in Seoul and Gyeongsangbuk-do almost stopped.[35]

Although the National Chemical Laboratory in Seoul succeeded in manufacturing DDT by February 1946,[36] most of the DDT used in Korea depended on imports.[37] Japan also used to import the final product of DDT to begin with. Since DDT has an active component of 10%, Japan imported condensed DDT and used it after mixing it with 90% talc. In May of 1946, DDT production was approved in Japan, and independent DDT production became possible in Japan (Sams, 1998: 85).

Although DDT was effective, it was not easy to control mosquitos. For example, the malaria infection rate was very high in southern rural areas, at approximately 20% and hence required more active mosquito control work than any other region. There are many rice paddies in southern rural areas, and mosquitos usually propagate in stagnant water such as rice paddies. Hence, DDT should have been sprayed in rice paddies for mosquito control. However, direct DDT spray on rice paddies was not an option,

32) Public Health and Welfare, USAMGIK Box 20, p. 223..
33) *Dongailbo*, 1 February, 1947.
34) *Dongailbo*, 4 June, 1947.
35) USAMGIK, APO 235 Unit 2, Monthly Report of Public Health and Welfare Activities for July, 1948. p. 1.
36) *Dongailbo*, 26 February 1946.
37) *Kyunghyangshinmun*, 24 April, 1947.

as DDT spraying kills rice.[38] Hence, there was not much to do in terms of mosquito control in rural areas where the actual infection rate was high.

The problem was not confined to DDT spray. Mosquito control was more effectively done through collaboration with the engineering battalion.[39] As stagnant water is a common place for mosquito propagation, it was possible to get rid of such mosquito propagation spots by making gutters to drain the water or filling puddles themselves. However, it was hard to expect this kind of direct action from the engineering battalion in Korea. Although a shortage of hands was the primary reason, a more serious problem was that randomly draining water from or filling in rice paddies regarded as the mosquito propagation origin was nearly impossible in Korea.

In fact, although the U.S. military suffered as a result of the malaria outbreak in the early phase of the Pacific War, it became able to systematically respond to malaria as experience and knowledge accumulated along with DDT development. This fact is clearly reflected in the manual published by MacArthur Headquarters right after the end of the war for controlling insect-borne diseases including malaria, as previously mentioned. However, when closely looking at the contents of the manual, there are several parts that are not applicable to the South Korean situation, as the manual was written based on experiences on the battlefields in the South Sea islands. For example, extensive DDT spray using airplanes was

38) Interview: Bureau of Public Health Chung Chong Namdo, Capt. William H. Townsend, 17 Apr 46. RG 332, USAFIK, XXIV Corps, G-2, Historical Section, Records Regarding the Okinawa Campaign, USAMGIX, Box No. 19, Farmer's Weekly, Jan.-May 1947 thru Miscellaneous Notes & Personal Papers Alexander Lane Public Health & Welfare (6 of 7). p. 22.

39) The Medical Department of the United States Army, *Preventive Medicine in World War II, vol. II. Environmental Hygiene*, p. 202. Office of the Surgeon General Department of the Army, 1955.

possible and engineering battalions could fill in the puddles of mosquito outbreaks using heavy machinery in the islands. However, it was not easy to directly apply such methods to South Korea. Hence, the anti-malaria activities through mosquito control were inevitably limited to some extent.

6. Conclusion

The anti-malaria activities led by the U.S. military government come to an end with the termination of military administration. Then, can we judge the anti-malaria activities during the military administration to be successful? It is hard to give a definite answer. Most of all, the decision on whether something is a success or a failure, differs depending on the criteria for success. Nevertheless, an indirect answer can be made by showing the changes from the previous period, i.e., the colonial period. First of all, the greatest change was the direct extermination activity on malaria's vector insect, i.e., the mosquito. As mentioned before, this was thanks to the development of the strong pesticide DDT. The malaria control during the colonial era relied on posterior measures such as quinine doses for prevention or treatment, rather than vector insect control, which can fundamentally prevent a disease outbreak. However, following the emergence of DDT, a transition toward a more fundamental direction of vector insect control became possible. One thing to point out is that DDT's potential damage to the human body or the environment was not seriously considered since there was little recognition of the side effects of DDT at the time. Moreover, the establishment of a more prompt and accurate report system about outbreak patients and of reliable disease statistics were improved compared to the past. Meanwhile, these improvements were not

just confined to malaria, but involved the overall disease report systems.

Of course, there were several limitations. For example, as the activity was mainly focused on cities and regions where the U.S. Army resided, regions with more severe malaria sometimes received little prevention support. Anti-malaria activities were conducted during the Korean War, and a nationwide malaria eradication project followed, which was supported by the WHO in the late 1950s. In particular, the malaria eradication project was the first large-scale project supported by the WHO, and it proves the fact that malaria was given first priority in public health at the time. Hence, the military administration's anti-malaria activities are significant, in that they provided a starting point for anti-malaria projects conducted afterwards.

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Keywords: anti-malaria activities, malaria, DDT, mosquito, vector control, U.S. military government

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-Abstract-

U.S. Military Administration's Malaria Control Activities (1945-1948)*

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To prevent and control infectious diseases was one of the major concerns of U.S. military government when they stationed in Korea in 1945. It was because the spread of various infectious diseases can cause social unrest and they can also affect the U.S. military. Malaria was one of the most important infectious diseases to which the U.S. military had been paying special attention. The U.S. military received a severe damage during the Pacific war with Japan due to malaria. It was said that more soldiers were lost by malaria than by battle itself. The bitter experience they had during the war made them accumulate more systematic and practical knowledge against malaria. As a result, by the end of the war, the U.S. military could run more than hundreds of units specialized in controlling malaria. Thanks to such a preparation, they could immediately begin their anti-malaria activities in Korea soon after the World War II. Although the vivax malaria, which is the dominant type in Korea, is not as much a fatal type as that

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in the Pacific areas, it was damaging enough to the infected. The 207th Malaria Survey Detachment carried out collecting and identifying the kinds of mosquitos in Korea. In addition, they also surveyed the prevalence of malaria among school children in Seoul. In terms of controlling malaria, DDT played a decisive role. Vector control is the most effective and ideal measurements against malaria. Before the development of DDT, it was practically impossible to eradicate mosquitos which arise from extremely broad areas. However, DDT could not be used as it had been expected in the rural area, because spraying DDT in the rice paddies which is the breeding place of mosquitos kills rice. Despite such a limitation in anti-malaria activities of the US military government, it should be noted that a significant turn in controlling malaria was possible thanks to the development of DDT.

Keywords: anti-malaria activities, malaria, DDT, mosquito, vector control, U.S. military government