

## List of Abbreviations

### used throughout the Report

Abbreviation	Proper Name
AFP	Acute Flaccid Paralysis
AIDS	Acquired Immunodeficiency Syndrome
ARI	Acute Respiratory Infection
ART	Anti-Retroviral Therapy
ARV	Anti-Retroviral (drugs)
ASIPAC	Asia Centre of International Parasite Control
CBO	Community Based Organization
CDC	Centers for Disease Control and Prevention
C/P	Counterpart
DANIDA	Danish International Development Agency
DFID	Department for International Development (UK)
DPT	Diphtheria/Pertussis/Tetanus Vaccine
DOTS	Directly Observed Treatment, Short-course
ELISA	Enzyme-Linked Immunosorbent Assay
E/N	Exchange of Notes
EPI	Expanded Programme on Immunization
ESACIPAC	Eastern and Southern Africa Centre of International Parasite Control
EU	European Union
FP	Family Planning
F/U	Follow-Up
GPCI	Global Parasite Control Initiative
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit German Development Corporation
G II	Global Issues Initiative on Population and AIDS
HBV	Hepatitis B Virus
HIV	Human Immunodeficiency Virus
IFPRI	International Food Policy Research Institute
IMCI	Integrated Management of Childhood Illness
IMR	Infant Mortality Rate
INSERM	Institut National de la Santé et de la Recherche Médicale (France) National Institute for Health and Medical Research
I-PRSP	Interim Poverty Reduction Strategy Paper
ITN	Insecticide Treated Net
IVM	Ivermectin
JICA	Japan International Cooperation Agency
JICC	Joint Interagency Coordination Committee
KEMRI	Kenya Medical Research Institute
MCH	Maternal Child Health
MDGs	Millennium Development Goals

NMIMR	Noguchi Memorial Institute for Medical Research
MMR	Maternal Mortality Rate
MTCT	Mother to Child Transmission
MOU	Memorandum of Understanding
NGO	Non-governmental Organization
NIDs	National Immunization Days
ORT/ORS	Oral Rehydration Therapy /Oral Rehydration Salts
OTCA	Overseas Technical Cooperation Agency (Japan)
PEPFER	President Bush's Emergency Plan for AIDS
PMTCT	Prevention of Mother to Child Transmission
PHC/PHS	Primary Health Care /Primary Health Services
PRSP	Poverty Reduction Strategy Paper
P3	Physical Contaminant 3
Sida	Swedish International Development Cooperation Agency
SP	Sector Programme
STD	Sexually Transmitted Diseases
SWAps	Sector Wide Approaches
TB	Tuberculosis
TBA	Traditional Birth Attendant
TICAD	Tokyo International Conference on African Development
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
UTH	University Teaching Hospital (Zambia)
U5MR	Under 5 Mortality Rate
VCT	Voluntary Counseling and Testing
VPD	Vaccine Preventable Diseases
WACIPAC	West African Centre for International Parasite Control
WFP	World Food Programme
WHO	World Health Organization
WWF	World Wide Fund for Nature

## Chapter 1 and 2

Abbreviation	Proper Name
CAMR	Centre for Applied Microbiology and Research (UK)
CDC	Centers for Disease Control and Prevention (USA)
CDSC	Communicable Disease Surveillance Centre (UK)
DHHS	Department of Health and Human Services (USA)
FDA	Food and Drug Administration (USA)
IUMS	International Union of Microbiological Societies
NCHS	National Center for Health Statistics (USA)

NCHSTP	National Center for HIV, STD, and TB Prevention (USA)
NCID	National Center for Infectious Diseases (USA)
NHS	National Health Service (UK)
NIAID	National Institute of Allergy and Infectious Diseases (USA))
NIBSC	National Institute for Biological Standards and Control (UK)
NICE	National Institute for Clinical Excellence (UK)
NIH	National Institute of Health (USA)
NIP	National Immunization Program (USA)
WHO/EURO	WHO Regional Office for Europe

#### Chapter 4

Abbreviation	Proper Name
ASIPAC	Asia centre of International Parasite Control
CSRPM	Centre for Scientific Research into Plant Medicine
ESACIPAC	Eastern and Southern Africa Centre of International Parasite Control
GAC	Ghana AIDS Commission
GHS	Ghana Health Service
GPRS	Ghana Poverty Reduction Strategy
HIMS	Health Information Management System
HRU	Health Research Unit
KCCR	Kumasi Centre for Collaborative Research in Tropical Medicine
MDBS	Multi-Donor Budgetary Support
MFEP	Ministry of Finance and Economic Planning
NACP	National AIDS Control Programme
NMCP	National Malaria Control Programmes
NMIMR	Noguchi Memorial Institute for Medical Research
NPHRL	National Public Health Laboratory
NTCP	National Tuberculosis Control Programme
OCRC	Onchocerciasis Chemotherapy Research Centre
PHD	Public Health Division/MOH
PHLs	Public Health Laboratories
PPME	Policy, Planning, Monitoring and Evaluation /MOH
WACIPAC	West African Centre for International Parasite Control
WHO/TDR	Special Programme for Research and Training in Tropical Diseases

#### Chapter 5

Abbreviation	Proper Name
AFHES	African Forum for Health Science
AMREF	African Medical and Research Foundation
ASIPAC	Asia Centre of International Parasite Control
CBRD	Centre for Biotechnology Research and Development/KEMRI
CCR	Centre for Clinical Research/KEMRI

CGIAR	Consultative Group on International Agricultural Research
CGMRC	Centre for Geographic Medicine Research/KEMRI
CMR	Centre for Microbiology Research/KEMRI
CPHR	Centre for Public Health Research/KEMRI
CPIDR	Centre for Parasitic and Infectious Disease Research/KEMRI
CRDR	Centre for Respiratory Diseases Research/KEMRI
CTMDR	Centre for Traditional Medicine and Drug Research/KEMRI
CVBCR	Centre for Vector Biology and Control Research/KEMRI
CVR	Centre for Virus Research/KEMRI
DVBD	Division of Vector-Borne Diseases/MOH
ESACIPAC	Eastern and Southern Africa Centre of International Parasite Control
FC	Finance Committee
ICIPE	International Centre of Insect Physiology and Ecology
ILCA	International Livestock Centre for Africa
ILRAD	International Laboratory for Research on Animal Diseases
ILRI	International Livestock Research Institute
IPR	Institute of Primate Research
ITROMID	Institute of Tropical Medicine and Infectious Diseases
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KEMRI	Kenya Medical Research Institute
KEMSA	Kenya Medical Supplies Agency
KETRI	Kenya Trypanosome Research Institute
KMTC	Kenya Medical Training College
NACC	National AIDS Control Council
NASCOP	National AIDS and STDs Control Programmes
NMCP	National Malaria Control Programmes
NPHLS	National Public Health Laboratory Services
NTBCP	National AIDS and STDs Control Programmes
NTP	National Tuberculosis Control Programme
PPHS	Department of Preventive and Promotive Health Services/MOH
SEAC	Staff Establishment and Appraisal Committee
SPC	Scientific Programmes Committee

## Chapter 6

Abbreviation	Proper Name
CBoH	Central Board of Health
CDL	Chest Disease Laboratory
DHB	District Health Boards
HMIS	Health Management Information Systems
HMB	Hospital Management Boards
ICU	Intensive Curative Unit
IEC	Information, Education, and Communication
NAISP	National HIV/AIDS/STI/TB Intervention Strategic Plan

NAC	National Aids Council
NMCC	National Malaria Control Centre
NCH	Ndola Central Hospital
NTP	National Tuberculosis Programme
TDRC	Tropical Diseases Research Centre
ZANARA	Zambia National Response to HIV/AIDS Project



# Executive Summary

## 1 Background and Objectives of the Study

Japanese cooperation with Africa through Official Development Assistance (ODA), in the field of health and medicine has focused on infectious diseases control, which has strengthened cooperation by combining the establishment of research institutes with capacity development in such countries as Ghana, Kenya, and Zambia. While the research capabilities of the institutes in these countries have been enhanced, the focus on cooperation has shifted from the enhancement of research capabilities to cooperation targeting the respective nations as a whole. Under this situation, the need to reconsider the functions and role of research institutes for infectious diseases has continued to arise.

In this evaluation study, the Noguchi Memorial Institute for Medical Research (NMIMR) in Ghana, the Kenya Medical Research Institute (KEMRI), and the Zambia University Teaching Hospital (UTH) have been selected as evaluation targets of Japan's cooperation in the field of infectious diseases control in Africa and their respective series of cooperation activities have been evaluated. In the process of the evaluation study, the outcomes of research on infectious diseases by the institutes and their ripple effects on public health were examined by comparing the positioning, functions and expecting roles of the institutes in order to extract recommendations for project planning and implementation. In this evaluation, the analysis was conducted in terms of research, human resources development, and contribution to health services, which constitute the functions of the present and expected roles of the research institutes in infectious diseases control in the health and medical sectors of Ghana, Kenya, and Zambia.

## 2 Functions of Research Institutes for Communicable Diseases in Developed Countries

Before examining the functions and role of the target institutes, those of the following research institutes for infectious diseases control in developed countries were analyzed as examples: NIID, the National Institute of Infectious Diseases in Japan, CDC, the Centers for Disease Control and Prevention in the United States, and CDSC, the Communicable Disease Surveillance Centre in the United Kingdom. As a result of this analysis, the functions of the research institutes can be identified in relation to the three aspects of 1) Research, 2) Human Resources

Development, and 3) Contribution to Health Services.

In the evaluation study, the functions and roles of the three research institutes in Ghana, Kenya and Zambia were analyzed based on the functions of research institutes in these developed countries in terms of research, human resources development, and contribution to health services (surveillance, reference, national control and other tests and research on medical materials) were utilized as the framework for the analysis.

### **3 Noguchi Memorial Institute for Medical Research: NMIMR**

In 1968, the Overseas Technical Cooperation Agency (OTCA), the predecessor of JICA, started to dispatch experts to the Korle Bu Hospital (Ghana College of Health Services) for the purpose of promoting research on virology. After the completion of the facilities of the NMIMR, technical cooperation provided at the Korle Bu Hospital was transferred to the institute. Since then, JICA has continuously cooperated with the NMIMR to improving its research capacity over a period of 28 years. Meanwhile, the Japanese government supported the development of the facilities and equipment of the NMIMR through the execution of grant aid projects, namely, the Noguchi Memorial Institute Rehabilitation and Extension Project in 1997 and so on.

The objectives of the series of JICA cooperation activities can be roughly divided into two stages. During the initial stage from 1968 to 1991, JICA focused on strengthening the capabilities of the university-affiliated institutions. Although the first project type technical cooperation, the Noguchi Memorial Institute Project, which started in 1986, included some activities related to infectious diseases control, such as quality control of vaccines, its focus was to transfer technical skills to the NMIMR. The second stage started in 1991 after Noguchi Memorial Institute Project Phase II. It aimed to strengthen the research capabilities of the NMIMR and to enhance the capacity of its health/medical personnel through technical training. This stage was intended to enhance and strengthen infectious diseases control in Ghana through capacity building of the health/medical personnel based on the NMIMR, which had acquired the appropriate research capacity during the period of the first stage of JICA technical cooperation. A series of JICA technical cooperation activities targeted Vaccine Preventable Diseases (VPD), HIV/AIDS and Sexually Transmitted Diseases (STD), Diarrhoeal Diseases, TB, and Schistosomiasis.

JICA has supported research activities on various infectious diseases since the

establishment of the NMIMR. As mentioned above, the NMIMR has extensively contributed to infectious diseases control in Ghana and the Africa region as a research institute and reference laboratory. For example, the NMIMR has been designated as the national reference laboratory for HIV and has established a position as a core referral laboratory, which deals with polio, yellow fever, tuberculosis, and so on. Moreover, as a core research institute for infectious diseases, the NMIMR contributes to infectious diseases control in the West African region as well as in the country by functioning as a WHO reference laboratory for Polio and conducting third country training for the surrounding countries.

In general, the role of the research institute is to develop techniques for infectious diseases control. A series of JICA cooperation activities involved carrying out research to improve health services, such as the distribution system of vaccines and improving the accuracy of diagnoses. These activities are therefore evaluated as having contributed to improving the health of the population indirectly through the improvement of health services.

However, a dichotomy between the needs of NMIMR and JICA assistance through technical cooperation aimed at technology transfer has accompanied the enhancement of the independence of the NMIMR through the strengthening of collaborative research with foreign institutes, although JICA's technical cooperation met the needs of the NMIMR in the initial stages of cooperation. It is concluded that a new cooperation scheme that treats the NMIMR as an equal partner is required to improve future cooperation.

Through a series of analyses based on the positioning, functions, and effects of JICA cooperation with the NMIMR, the expected future roles of the NMIMR can be summarized as follows in terms three functions. (1) To maintain the strengthen of its research on infectious diseases that should be eradicated in West Africa and throughout Africa by promoting joint research with foreign universities and research institutes, as well as conducting leading research on infectious diseases control in Ghana as a research institute equipped with advanced diagnostic techniques that are indispensable for infectious diseases control through molecular level analysis and genetic analysis, (2) To serve as a center for human resources development as an executing agency for the in-service training of medical personnel in Ghana and third country training for the surrounding countries, and to establish a position as a research base for infectious diseases control in West Africa under the framework of the West African Centre for International Parasite Control Project, (3) To expand health services that lead to

enhanced public health, including the quality control of vaccines, research on drug resistance in malaria, and information transmission as a reference laboratory through coordination with the Ministry of Health

#### **4 Kenya Medical Research Institute: KEMRI**

JICA started project-type technical cooperation on infectious diseases control, namely, the Communicable Disease Research and Control Project, in cooperation with the Division of Vector Borne Diseases (DVBD), the Ministry of Health, and the National Public Health Laboratory Services in March 1979, based on a request from the Government of Kenya. The KEMRI has been the main partner for JICA projects since its main facilities were completed with Japanese Grant Aid in 1981. JICA has continuously implemented project-type technical cooperation with the KEMRI, and there were seven projects implemented up to 2004. The Government of Japan further supported the development of the facilities and equipment of the KEMRI through the implementation of grant aid projects, including the Project for Improvement of the Kenya Medical Research Institute in the Republic of Kenya in 1997.

This series of JICA cooperation activities have aimed at strengthening the research capacity of the KEMRI. Human resources development in the health sector has formed an additional objective of JICA's cooperation, and workshops/seminars aimed at disseminating the research outputs to other medical organizations were started in 1990. A series of JICA technical cooperation activities targeted diarrhoea, acute respiratory infection (ARI), hepatitis, HIV/AIDS, schistosomiasis, and filariasis.

A characteristic of JICA's cooperation with the KEMRI is that the activities have concentrated on two main functions - blood screening and parasite control. Blood screening activities, in particular, enabled the test kits developed by the KEMRI to be disseminated nationwide through coordinated research and training activities. In addition, as a research institute and a WHO collaborating center, the KEMRI has greatly contributed to infectious diseases control in Africa as well serving as an educational and training institute.

Under a series of hepatitis control activities conducted by the KEMRI, hepatitis control has been implemented with the focus on protection from hepatitis B through JICA support for epidemical surveys and the development and diffusion of testing kits for hepatitis B, which has brought about a significant improvement in the screening rate of the blood supply, and the enhancement the blood-testing techniques through training.

Moreover, the KEMRI disseminates diagnostic and experimental techniques by conducting third country training on blood screening (hepatitis B and HIV/AIDS).

On the other hand, as with the NMIMR, the KEMRI had also acquired sufficient capacity as a research institute. In view of the fact that cooperation between JICA and the KEMRI is proceeding to the next stage, JICA should consider the validity of cooperation that has the primary aim of technology transfer. It is, therefore, necessary to establish a new cooperation framework for the KEMRI with the activities consisting of mainly collaborative research with foreign institutes.

Through a series of analyses based on the positioning, functions, and effects of JICA cooperation with the KEMRI, the expected role of the KEMRI in the future can be summarized as follows in terms three functions. (1) To strengthen the functions of infectious diseases control comprising research, human resources development, and contribution to health services through the research and development, production, and dissemination of several blood testing kits, such as an HIV/AIDS testing kit that is low in price and can be produced in Kenya, (2) To serve as a center for human resources development as an executing agency for the in-service training of medical personnel in Ghana and third country training for the surrounding countries, and to establish and expand epidemiological databases on emerging and re-emerging infectious diseases, and expand its reference functions, such as information transmission

## **5 Virology Laboratory and Tuberculosis Laboratory of the University Teaching Hospital: UTH**

JICA started the University of Zambia Medical School Project with the purpose of enhancing technology in the areas of neonatal care and paediatric surgery from 1980. When the University of Zambia Medical School Project was closed in 1989, the importance of prevention, diagnosis, and care for infectious diseases in infants was emphasized as a recommendation of the final evaluation of the project. In response to the request of the Zambian government, after the year 1989, JICA designated the UTH as an implementing agency and carried out three technical cooperation projects aimed at infectious diseases control. The Virology Laboratory and the Tuberculosis (TB) Laboratory, which belong to the laboratory services department of the UTH, served as counterparts for these projects, and JICA conducted technical cooperation to establish the diagnostic capacity for infectious diseases in Zambia. Moreover, in order to develop the infrastructure for research activities, JICA constructed a building for the

Virology Laboratory in 1991, and a building for the TB Laboratory using the budget for project-type technical cooperation.

A series of cooperation activities was initiated with the aim of establishing the diagnostic capacity for infectious diseases in Zambia. These focused on the establishment and capacity building of the Virology Laboratory of the UTH in the initial stage of cooperation. After the Virology Laboratory acquired the necessary technology and facilities, the target of the cooperation was expanded nationwide through its participation in the EPI Programme, Polio Eradication Programme, and HIV sentinel survey. A series of JICA technical cooperation activities targeted Viral Diarrhoea, Acute Respiratory Infections (ARI), Hepatitis, Polioviruses and other Enteroviruses, Measles, HIV/AIDS, and TB. As a result of the evaluation of the Infectious Diseases Control Project, JICA judged that the Virology Laboratory and the TB Laboratory had already acquired the diagnostic technology for the target diseases in the initial stage of cooperation, namely, for diarrhoea, ARI, Hepatitis, polio, and measles. Thus, since 2001, JICA has focused the targets of cooperation on HIV/AIDS and TB, which have comprised the foremost public health problem in Zambia.

Both laboratories have worked to establish a national surveillance network for measles through JICA assistance and have contributed to establishing the diagnostic capability for infectious diseases in Zambia; for instance, by conducting external quality assurance for HIV and tuberculosis tests. In addition, they contribute to infectious diseases control with respect to health services, including the provision of training for medical personnel in regional laboratories, the diagnosis of specimens, external quality assurance, and so on. Moreover, the Virology Laboratory has an important role in infectious diseases control as the WHO inter-country reference laboratory for Polio and a reference laboratory for measles and influenza, not only for the nation, but also for the surrounding countries. Through a series of analyses based on the positioning, functions, and effects of JICA cooperation with the UTH Virology Laboratory and Tuberculosis Laboratory, the expected roles of the UTH Virology Laboratory and Tuberculosis Laboratory in the future can be summarized as follows in terms of three functions. (1) To strengthen research on HIV and tuberculosis, which is a type of opportunistic infectious disease, at a time when the diffusion of anti-retrovirus therapy has become an increasingly critical issue, by adopting the global 3 by 5 ART, in addition to its existing research on related diseases in the Expanded Programme on Immunization, (2) To hasten the provision of medical personnel dealing with HIV testing in provincial and county hospitals and VCTs as part of human resources development for HIV/AIDS

control, and, moreover, to establish an experimental and diagnostic system capable of contributing to HIV/AIDS control with ART, in cooperation with the research and human resources development mentioned above.

## **6 Conclusions**

### **6.1 Effects of Cooperation with the Three Target Research Institutes**

In reviewing the relationship between each research institute and the respective supervising agency, the NMIMR is a semi-autonomous institution under the University of Ghana, the KEMRI is directly under the jurisdiction of the Kenyan Ministry of Health, and the UTH, which is the parent organization of the UTH Virology and Tuberculosis Laboratories, is under the jurisdiction of the Ministry of Health (hospital facilities) and the Ministry of Education (school of medicine facilities). As a result of the evaluation study, it has been found that the three institutes contribute to infectious diseases control through their similar functions comprising research/diagnosis, human resources development, and surveillance/reference services under the framework of the functions of infectious diseases control, although their positioning as research institutes differs.

According to the past project evaluation reports, the objects of JICA cooperation have been the three research institutes and the expected effects of cooperation have not gone beyond research and human resources development. However, as can be seen, the fact that each research institute dispatches researchers to health programmes and committees organized by the health ministries and provides technical advice, and representatives of the health ministries are engaged in the management of the research institutes, the JICA cooperation has had an affect on administrative decision-making through the research institutes and the institutes conduct personnel training with respect to public health.

The following describes the commonality of the effects of JICA cooperation with the three research institutes elucidated in the evaluation study.

- At the beginning of JICA cooperation, the collaborative relationship between the two institutes and the Ministry of Health was weakened and the administrative routes for reflecting the results of research in communicable disease control initiated by the Ministry of Health were not sufficiently established. At present, the three research institutes conduct research in collaboration with their respective Ministries of Health, and they are regarded as major research institutes involved in infectious diseases control in each country.

- The NMIMR, the KEMRI, and the UTH Virology and Tuberculosis Laboratories conduct testing and quality assurance in the process of infectious diseases control as reference laboratories, which cannot be replaced by any other laboratory in their respective countries or in the surrounding countries. In particular, the UTH Virology Laboratory has contributed to eradicating polio in Zambia in cooperation with the Polio Eradication Programme.
- The research facilities provided through Japanese cooperation were essential for the acquisition of the advanced technology transferred by the Japanese counterparts. In addition, the establishment of a foundation for advanced research has made it possible to carry out joint research activities with overseas research institutions. Moreover, conducting joint research activities with overseas institutions has in turn further enhanced the research capacity of each institute. These institutes, which are dependent on external research subsidies, have also become able to strengthen their financial base through such joint research activities with overseas research institutions.
- All three research institutes, the NMIMR, KEMRI, and UTH, are top-level institutes in their respective countries, and function as not only research institutes, but also training facilities in the field of health and medicine. Each institute conducts technical training activities for health and medical personnel, as well as graduate and undergraduate students. Moreover, the researchers at the NMIMR and the KEMRI lecture at national universities in their respective countries.
- Each research institute dispatches researchers to health programmes and committees organized by their Ministries of Health, and give advice to these ministries. The achievements of JICA cooperation have contributed to infectious diseases control by the governments in the form of technical assistance to health programmes and committees beyond the scope of the research institutes, although this was not originally anticipated as an effect of the cooperation.

## **6.2 Roles of the Research Institutes**

The three research institutes are expected to continue basic and applied research based on the needs derived from health policies. Research should be strengthened in the following areas.

### **(1) Research**

- To strengthen practical applied research in priority areas
- To strengthen research on emerging/re-emerging infectious diseases and parasitic diseases
- To strengthen research on infectious diseases control based on regional characteristics through operational research in order to develop preventive methods and medical cures in Africa
- To strengthen operational research through participatory approaches in order to increase the effects of infectious diseases control

### **(2) Reference Laboratory/ Surveillance Tasks**

- To strengthen the establishment and expansion of epidemiological databases and information transmission capacity for HIV/AIDS and emerging / re-emerging infectious diseases
- To participate in epidemiological surveys by the governments as representative surveillance institutions in their respective countries and to strengthen and provide quality control for subordinate testing institutions
- To introduce advance infectious diseases testing and diagnostic techniques and to strengthen the dissemination of techniques to related domestic medical institutions
- To strengthen infectious diseases control within the region by providing reference services to the surrounding countries that do not have sufficient diagnostic techniques

### **(3) Human Resources Development**

- To develop the capacity of medical researchers in the region by conducting research on infectious diseases control
- To contribute to human resources development in the field of medicine among the next generation by providing medical education and opportunities for research on infectious diseases to graduate and undergraduate students from home and abroad
- To strengthen infectious diseases control by the transfer of techniques through third country training to medical personnel from the surrounding countries as a base for JICA cooperation in the region

## Recommendations on the Effective Use of Each Research Institute

### **(4) Joint Research**

JICA has implemented technical cooperation for the purpose of enhancing the research capacity of the institutes, which has been sufficiently fulfilled. For the future, an examination should be made of how to utilize the research capabilities of the research institutes as development partners in the field of medicine and health in Africa. In African countries, health projects for the purpose of the examination of effectiveness of surveillance and medical cures can be executed efficiently and effectively by entrusting them to the research institutes familiar with local conditions.

### **(5) Cooperation to Maintain Functions as Reference Laboratories**

It is important that each research institute participate in the survey activities implemented by health ministries and the WHO aimed at improving the health sector and for their testing and diagnostic capabilities to be effectively utilized. It is desirable for JICA to review the institutes' requirements and to provide assistance in terms of maintaining research facilities and human capacity development for renewing the facilities and equipment as needed.

### **(6) Utilization as Research Institutes**

An issue that must be reviewed in future is how JICA will utilize the training functions of the NMIMR, the KEMRI, and the UTH Virology and Tuberculosis Laboratories. Possible uses include functioning as training facilities for health projects implemented in other African countries, as support for training activities carried out independently by each institute, or consigning third country training activities to each institute as part of South-South Cooperation.

On the other hand, Japanese research institutes and universities can also utilize the research institutes as a training facility for Japanese health personnel. As Japan is located in a temperate zone, it has environmental limitations in its study of tropical diseases. With JICA assistance, Japanese students and young researchers can utilize these three research institutes, which have established deep ties with Japan. It is also effective to further exchanges between Japan and African countries in the medical research field in order to promote infectious diseases research in Japan.

## **(7) Strengthen Regional Networks**

After completing the establishment of regional networks based on the three research institutes, it is desirable to promote the dispatch of third country experts and south-south cooperation. From now on, the mainstream of cooperation in the field of health is expected to be support for ART and participatory approaches to regional public health. Examination should be made of how to promote cooperation effectively by utilizing the personnel who have research experience in the three research institutes.

JICA has been implementing long term cooperation in terms of technical transfer and facility development since the establishment of the research institutes. It has been verified by the evaluation survey that as a result of JICA cooperation, each institute is acknowledged internationally as a centre for research in the health and medical field and has sufficient research capabilities. From now on, JICA is expected to examine the orientation of cooperation with these research institutes to ensure effective contributions to infectious diseases control in the Africa region through proactive engagement with these research institutes.

# **Section 1**

## **Framework of the Evaluation**

# **Section 1 Framework of the Evaluation**

## **1 Outline of the Study**

### **1.1 Background to the Study**

The foremost causes of mortality in Africa are malaria, tuberculosis, diarrhea, HIV/AIDS and other infectious diseases. One of Japan's priorities for cooperation in health and medical care in Africa is to implement preventive measures against infectious diseases. As costly investments are required in order to procure equipment and basic technical facilities to carry out examinations and research on infectious diseases, and administrative and maintenance expenses for such facilities are high, it is difficult for African countries in vulnerable economic circumstances to acquire research institutions and laboratories. However, by creating core reference laboratories in a designated region, a regional testing network can be established that can efficiently handle the demands of the region.

Based on this concept, Japan has provided long-term cooperation in the three countries of Ghana, Kenya, and Zambia in the form of assistance to research institutions to conduct research and the examination of infectious diseases, as well as the implementation of human resources development programmes. For example, technical cooperation was provided for the College of Health Services, University of Ghana, in 1968; the Noguchi Memorial Institute for Medical Research was created under the grant aid scheme in 1977; project type technical cooperation has been implemented since 1986; and Third Country Training Programmes have been conducted since 1991. Japanese cooperation has not been confined to Ghana alone, but assistance to foster health care personnel as well as research cooperation has been carried out in neighboring countries. In addition, technical cooperation aimed at human resources development and research on infectious diseases control has been implemented based on facilities constructed under the grant aid and technical cooperation scheme in such countries as Kenya and Zambia.

As a result of the establishment of research institutes and subsequent long-term cooperation in Ghana, Kenya and Zambia, the research capacity of these institutes has been strengthened in terms of human and institutional resources. On the other hand, the priority for cooperation in the health and medical sector has been shifting to cooperation targeting the nation from assistance provided to research institutes, with the expectation of ripple effects for the nation as a whole through the enhancement of overall research capacity. Under the circumstances, it is necessary to examine the functions and roles of research institutes for communicable diseases control in order to progress with cooperation in the area of infectious diseases control.

## **1.2 Objects and Objectives of the Evaluation**

The Noguchi Memorial Institute for Medical Research (NMIMR) in Ghana, the Kenya Medical Research Institute (KEMRI), and the Zambia University Teaching Hospital (UTH) have been selected as evaluation targets of Japan's cooperation in the field of infectious disease control in Africa and their respective series of cooperation activities are evaluated here. In the process of the evaluation study, the outcomes of research on infectious diseases by the institutes and the ripple effects in the field of public health are examined in comparison with the positioning, functions and expected roles of the institutes in order to derive recommendations for project planning and implementation.

The evaluation questions are as follows.

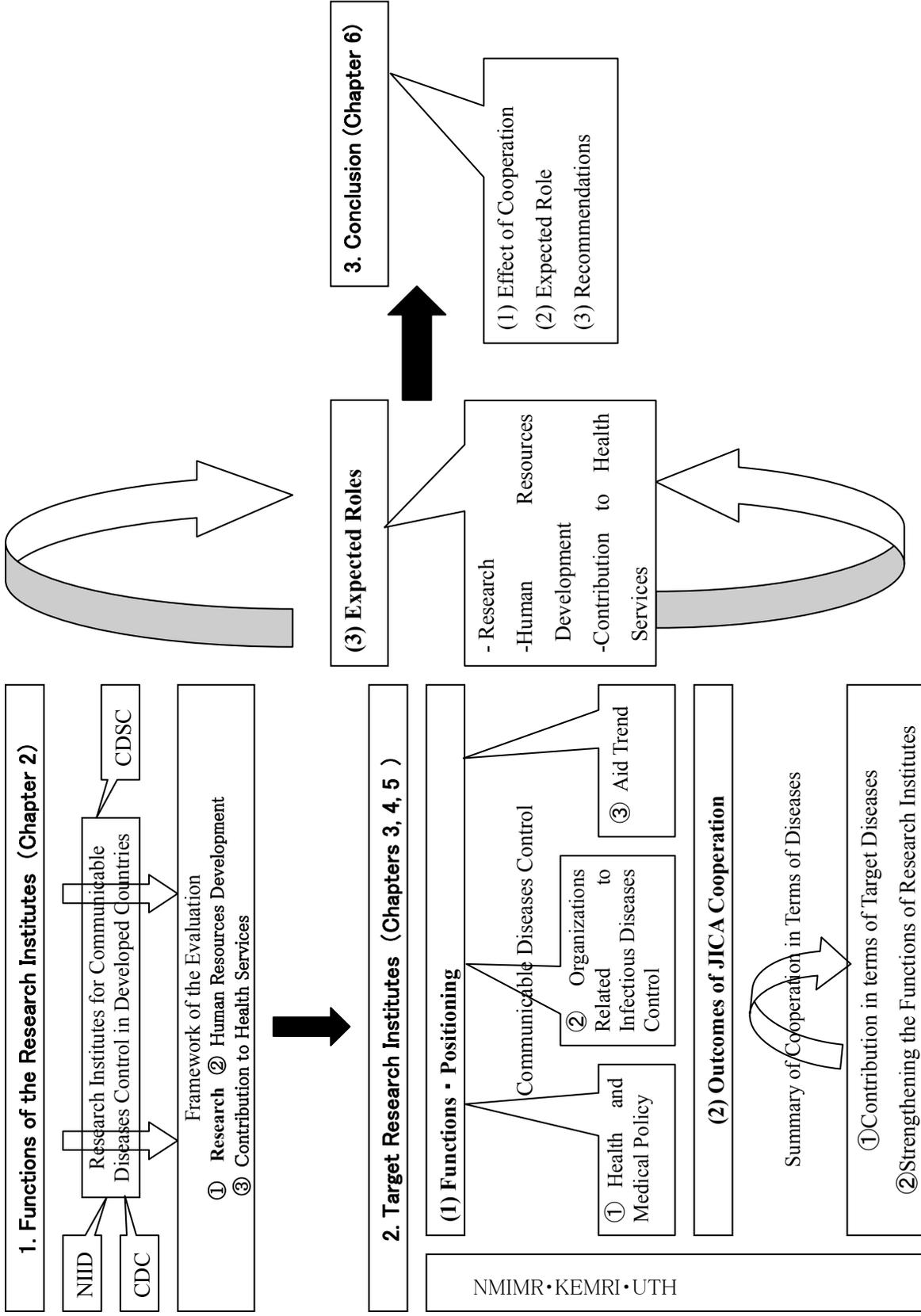
“How do the research institutes function and what ripple effects have they brought to the field of public health in comparison with the positioning and functions of the institutes under the health sector of the target countries and neighbouring countries through Japanese cooperation with representative research institutes for communicable diseases control in Africa?”

“In addition, how should the institutes be positioned and how should they fulfil their role in infectious diseases control in the health sector of the target countries?”

## **1.3 Evaluation Methodology**

The study was conducted through the following steps (see Figure 1.1 Conceptual Diagram of the Evaluation Methodology).

Figure 1.1 Conceptual Diagram of the Evaluation Methodology



### **1.3.1 Functions of the Research Institutes**

Before examining the functions and role of the target institutes, research institutes related to infectious diseases control in the developed countries, such as NIID: National Institute of Infectious Diseases in Japan, CDC: Centers for Disease Control and Prevention in the United States, and CDSC: Communicable Disease Surveillance Center in the United Kingdom, are analyzed so that the functions of such research institutes can be identified according to the three aspects of 1) Research, 2) Human Resources Development, and 3) Contribution to the Health Services. In this study, these three functions are utilized as the framework for analysis.

### **1.3.2 Examination of the Target Research Institutes**

The expected role of the target research institutes is clarified by examining how JICA cooperation has had an effect on strengthening the functions of the research institutes and how it has contributed to infectious diseases control in comparison with the functions and position of the respective target research institutes in infectious diseases control.

#### **(1) Examination of the Functions and Positioning**

The current functions of the respective research institutes are analyzed with reference to the general functions of research institutes for communicable diseases defined in 1.3.1. Subsequently, the positioning of the respective target research institutes in their countries is clarified taking into consideration the specific circumstances of the target countries, including health and medical policies, aid trends, and relations with related institutions for infectious disease.

#### **(2) Evaluation of JICA Cooperation**

Project activities executed by each research institution are sorted according to the target diseases, and an examination is made on how JICA assistance has contributed to infectious diseases control. The overall cooperation goal is established for the study based on what JICA and the respective governments are trying to achieve through a particular series of cooperation activities. The evaluation study is conducted by assessment of how the outcomes of each series of cooperation activities have contributed to infectious diseases control in the target countries and how long the impact of the contribution lasted after the termination of JICA cooperation.

### **(3) Expected Role**

To provide a summary of the analysis mentioned above, the expected roles of the research institutes in infectious diseases control are identified in terms of the framework of the evaluation, which are 1) Research, 2) Human Resources Development, and 3) Contribution to the Health Services.

#### **1.3.3 Recommendations**

As a result of the analysis described in 1.3.2, an overall summary of the effects of cooperation by JICA is examined and common factors promoting continued cooperation are derived from this. Consequently, the direction of future cooperation is presented with a table of the expected roles of the research institutes.

### **1.4 Process of the Evaluation Study**

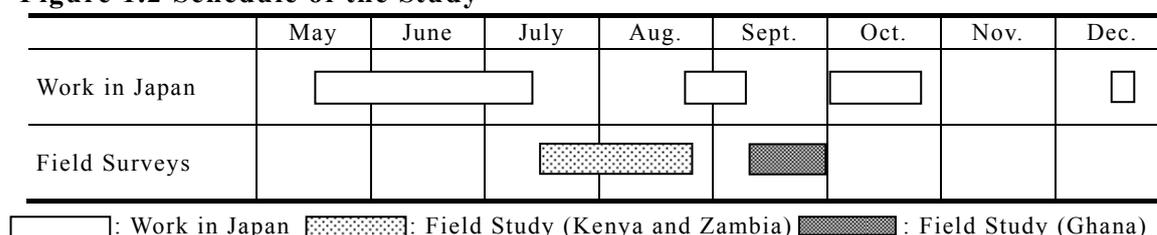
#### **1.4.1 Evaluation Investigative Commission**

The Evaluation Investigative Commission was established in order to discuss evaluation questions, the framework, the scope of the evaluation, the strategy for the field study, and the method of compiling the results of the study. The members of the Evaluation Investigative Commission are shown in table 1.1.

**Table 1.1 Members of the Evaluation Investigative Commission**

Name	Affiliation
<Advisors>	
Hiroshi Suzuki	Professor and Chairman, Division of Public health, Department of Infectious Diseases Control and International Medicine, Niigata University Graduate School of Medical and Dental Sciences
Yasuo Moritsugu	Ex-Deputy Director, National Institute for Infectious Diseases (former National Institute of Health)
Koichi Miyoshi	Professor, Graduate School for Asia Pacific Studies, Ritsumeikan Asia Pacific University
<JICA staff>	
Gen Usui	Infectious Diseases Control team, Group IV (Health II ), Human Development Department, Japan International Cooperation Agency
Satoshi Kadowaki	South Africa Team, Regional Department IV (Africa), Japan International Cooperation Agency
Satoko Miwa	Director, Office of the Evaluation, Planning and Coordination Department, Japan International Cooperation Agency
Kazuaki Sato	Evaluation Planning and Coordination Team, Office of the Evaluation, Planning and Coordination Department, Japan International Cooperation Agency
Ayumu Ohshima	Country and Thematic Evaluation Team, Office of the Evaluation, Planning and Coordination Department, Japan International Cooperation Agency (as of Nov. 2005)
Muneyuki Kozu	Country and Thematic Evaluation Team, Office of the Evaluation, Planning and Coordination Department, Japan International Cooperation Agency
< Consultants >	
Shigeru Kobayashi	System Science Consultants inc.
Keiko Muramatsu	System Science Consultants inc.

#### 1.4.1 Schedule of the Study

**Figure 1.2 Schedule of the Study**

#### 1.4.2 Members of the Study

Following the analysis in Japan from May 2004, information collection and site visits were carried out in Kenya (from 17th July to 6th August) and in Zambia (from 7th to 25th August) as the initial field surveys. The field survey for Ghana took place from 11th to 30th of September as the second field survey, in addition to

the first field survey. The schedule of the evaluation study is shown in Figure 1.3.

**Table 1.2 Members of the First Field Survey (Kenya and Zambia)**

Name	Sector	Position	Survey period
Prof. Hiroshi SUZUKI	Team leader	Department of Infectious Diseases Control and International Medicine Niigata University Graduate School of Medical and Dental Sciences	Kenya 1st to 6th August Zambia 7th to 18th August
Mr. Shigeru KOBAYASHI	Evaluation Analysis	System Science Consultants INC.	Kenya 17th to 6th August Zambia 7th to 25th August
Ms. Keiko Muramatsu	Analysis of Research Institutes	System Science Consultants INC.	Kenya 17th to 6th August Zambia 7th to 25th August
Mr. Muneyuki Koza	Evaluation Planning	Associate Expert, Office of the Evaluation, Planning and Coordination Department, Japan International Cooperation Agency (JICA)	Kenya 17th to 6th August Zambia 7th to 14th August

**Table 1.3 Members of the Second Field Survey (Ghana)**

Name	Sector	Position	Survey period
Ms. Satoko MIWA	Team leader	Director, Office of the Evaluation, Planning and Coordination Department, Japan International Cooperation Agency (JICA)	11th to 19th September
Prof. Hiroshi SUZUKI	Communicable Diseases Control	Department of Infectious Diseases Control and International Medicine Niigata University Graduate School of Medical and Dental Sciences	10th to 20th September
Mr. Shigeru KOBAYASHI	Evaluation Analysis	System Science Consultants INC.	11th to 30th September
Ms. Keiko Muramatsu	Analysis of Research Institutes	System Science Consultants INC.	11th to 30th September



## **2 Functions of Research Institutes for Communicable Diseases in Developed countries**

This chapter examines the functions of typical research institutes for infectious diseases in Japan, the United States, and the United Kingdom in order to clarify the functions generally played by such research institutes. Reference is made to the functions confirmed here as forming a framework for the analysis of the functions and roles of the research institutes that are the targets of this study in three African countries; Ghana, Kenya, and Zambia.

### **2.1 Functions of Research Institutes for Communicable Diseases in Japan**

#### **2.1.1 Implementing Agencies for Communicable Diseases Control**

In Japan the Health Services Bureau of the Ministry of Health, Labour and Welfare (MOHLW) and the Specific Diseases Control Division and the Tuberculosis and Infectious Diseases Control Division under this bureau are in charge of infectious diseases control. The implementing agencies and their role at each administrative level (national, prefectural and city/ward levels) are defined by the “Law on Infectious Diseases Prevention and Treatment for Infected Patients (came into effect in 1998, with the latest revision in 2005)”.

As the responsible ministry for infectious diseases control at the national level, the MOHLW formulates the basic policy for infectious diseases control, and prepares and publishes preventive guidelines for specific infectious diseases that should be treated according to comprehensive control measures. In addition, the MOHLW supports the implementing agencies in their execution of infectious diseases control at the prefectural and district levels.

Based on the national policy, implementing agencies at the prefectural level draw up prevention plans and action plans. These plans regarding infectious diseases control are implemented by Health Departments and Health Divisions, and Health Centres at the city/ward level. Health Divisions and Health Centres in each city/ward also offer health services, such as information on outbreaks of infectious diseases and immunization, as the executive bodies for infectious diseases control.

#### **2.1.2 Functions of the Research Institutes for Communicable Diseases Control**

As mentioned above, the infectious diseases control system consists of institutions at the national, prefectural and city/ward level. At the national level, research institutes specialized in the field of infectious diseases, such as the National Institute of Infectious Diseases (NIID), are attached to the MOHLW. Besides these, there are also some organizations, such as the Japan Public Health Association, that carry out research and studies in specific fields. The major organizations related to infectious diseases control and their objectives are summarised in Table 2.1.

**Table 2.1 Major Organizations for Communicable Diseases Control**

Organization	Objectives
<b>National Research Institutes</b>	
National Institute of Infectious Diseases (NIID)	NIID aims to carry out extensive and original research projects on a variety of contagious diseases from the standpoint of preventive medicine, improving human health and welfare by suppressing infectious diseases, and clarifying and supporting the scientific background for the health and medical administration of the country.
National Institute of Health and Nutrition (NIHN)	NIHN provides leadership for the public by conducting surveys and research on the maintenance and promotion of health as well as nutrition, diets, and lifestyles.
National Institute of Health Sciences (NIHS)	NIHS is responsible for conducting basic research to ensure the quality, efficacy and safety of a wide range of products that directly and indirectly affect the populace. In addition, NIHS investigates the manufacture of medicines and medical devices, gives approval for imports, and conducts the re-examination and reevaluation of drugs.
International Medical Center of Japan (IMCJ)	IMCJ contributes to social health and welfare from the global viewpoint through the provision of the best medical treatment that is available based on the dignity of human beings and the execution of education and research.
<b>Related Organizations</b>	
(Foundation) Japan Public Health Association	JPHA is an incorporated foundation to promote public health and is devoted to enhancing the quality of the health of the nation.
(Foundation) Japan Anti-Tuberculosis Association	JATA aims to enhance the health of Japanese citizens through cures and prevention for TB and other diseases, and executes international cooperation for TB control.
(Foundation) Blood Products Research Organization	The objectives of BPRO are to collect and analyze information on blood products generated domestically and overseas, and to conduct the necessary research and surveys in order to promote appropriate processing practices for, and national self-sufficiency in, blood products (including alternative products) derived from domestically donated blood.
(Foundation) Viral Hepatitis Research Foundation of Japan	VHRFJ contributes to enhancing public health and the welfare of the nation by promoting research and disseminating diagnostic and preventive measures regarding hepatitis, cirrhoses, and liver cancer, which originate from the hepatitis virus, and the development of cooperation with academic societies in Japan and overseas.
Quarantine Stations (Ministry of Health, Labour and Welfare)	The quarantine service aims to protect life and human health from the threat of urgent issues, such as outbreaks of emergent and re-emergent infectious diseases and health security in relation to imported goods.
National Institute of Animal Health (Ministry of Agriculture and Fishery)	NIAH has established a network and shares information on zoonotic infections.

Prepared by the investigation team

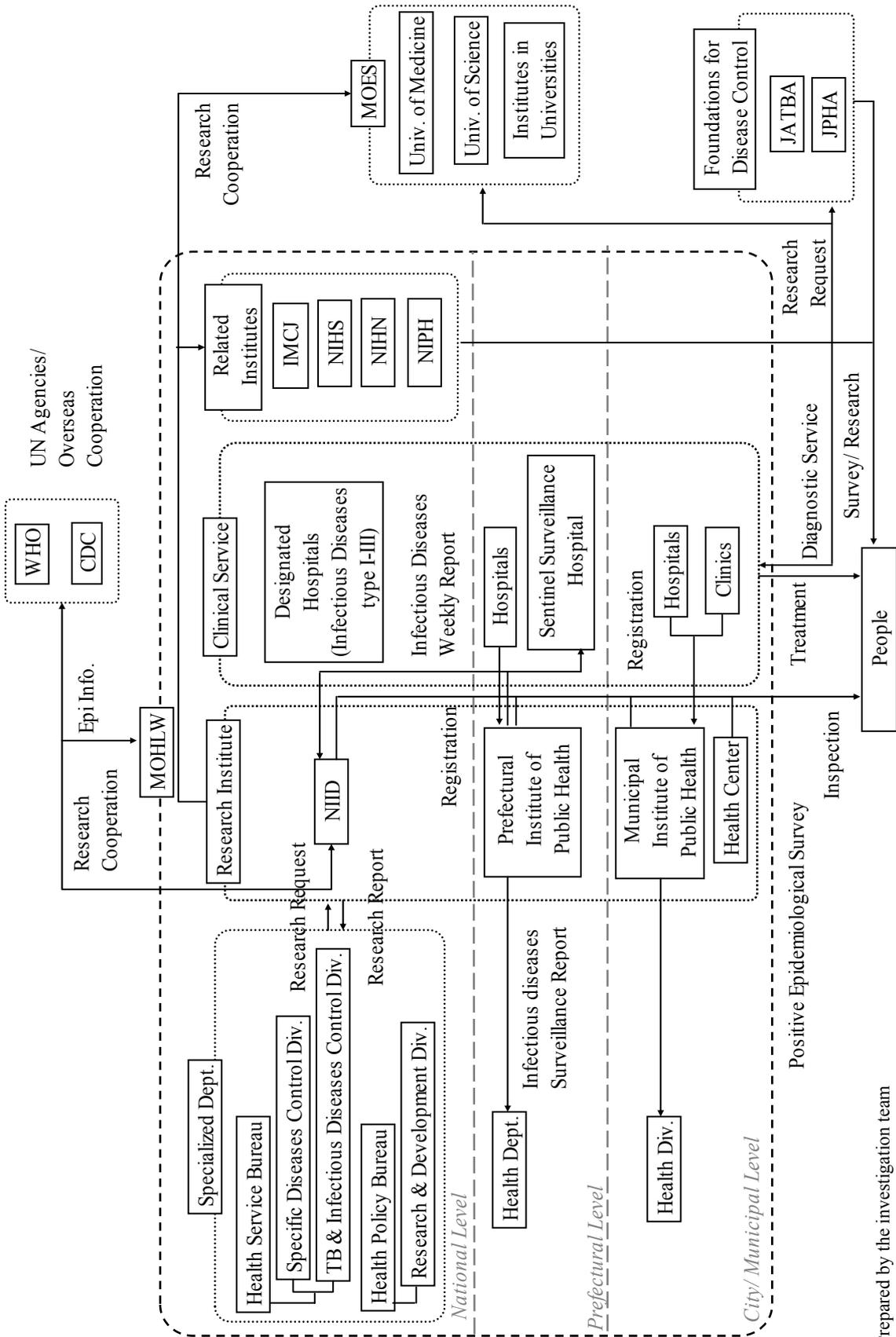
On the other hand, prefectural and municipal institutes for public health collect epidemiological information and data at the local level. Information collected by local public health institutes is accumulated at the Infectious Disease Surveillance Centre of NIID and is then disseminated regularly to prefectural and municipal institutes for public health and related organizations throughout the nation. In the event of an outbreak of an infectious disease in a local area, the local medical facilities ask the municipal institutes for public health to examine and determine the endemic causes. Nevertheless, when local institutes for public health have more work than they can manage, NIID supports the diagnosis of any referred pathogens. Endemic

information collected through local public health institutions is referred to the MOHLW and WHO.

In addition to the public organizations mentioned above, basic and applied research on various diseases, including infectious diseases, is conducted by research institutes affiliated to science and medical colleges.

The interactions among organizations related to infectious diseases control are shown in Figure 2.1.

**Figure 2.1 Intership between Organizations related to Communicable Diseases control**



Prepared by the investigation team

### 2.1.3 Functions of NIID

As mentioned above, NIID is the main research institute for infectious diseases control in Japan and is obliged to conduct research to meet national priority targets in the health sector, and its research outcomes are expected to contribute to proven social benefits.

The functions of NIID can be divided into research activities, reference services for infectious diseases, surveillance of infectious diseases, national assays, international cooperation, and training activities. Reference services aim to provide the testing systems for infectious diseases; the surveillance services aim to collect, analyse, and distribute information on infectious diseases, and the national assays aim to conduct national tests to guarantee the quality of biological products (vaccines and blood products) and provide reference standards for such biological and antibiotic products that are required for national assays. Unlike the research activities and training activities conducted by the research institute itself, such services including reference services, surveillance services, and national control tests and other tests conducted in cooperation with other affiliated institutes of the MOHLW as part of a national programme. Therefore, in this report, these services are categorized as “health care services”.

International cooperation comprises surveillance activities, such as isolation and identification of pathogens and epidemiological investigation and diagnosis; reference services such as the preparation and supply of standard materials, the improvement of diagnostic antigens; and training activities for overseas trainees. All of these activities are functionally categorized into surveillance, reference, national control tests and other tests, and training activities. Therefore, in this report the activities under international cooperation are re-categorised into surveillance, reference, national control tests and other tests, and training activities.

From these viewpoints, the functions of NIID are categorised into research, human resources development and contributions to the health service, such as reference services, surveillance, and national control tests and other tests as shown in Table 2.2.

**Table 2.2 Basic Concepts and Activities of NIID**

Basic Concepts	Activities
Research	<ul style="list-style-type: none"> <li>➤ Basic and applied research on infectious and other intractable diseases associated with the immune system.</li> <li>➤ Molecular biological analyses of the etiological agents as well as the development and application of rapid diagnostic methods for important diseases emerging or re-emerging and also other traditional diseases</li> <li>➤ Vaccine development and applied research.</li> <li>➤ Development of vectors and safety evaluation of gene therapy</li> </ul>
Human Resources Development	<ul style="list-style-type: none"> <li>➤ Various group and individual technical training courses on AIDS, poliomyelitis and leprosy for overseas trainees.</li> <li>➤ Planning and execution of training programs for workers at domestic research institutes</li> </ul>
Health Care Services	<p><b>【Surveillance Services】</b></p> <ul style="list-style-type: none"> <li>➤ Collection of reports on the detection of infectious agents from prefectural public health institutes and on incidents of infectious diseases from sentinel clinics throughout the country. This information is made accessible to the public.</li> <li>➤ Conducting epidemiological investigations in the event of an epidemic or the outbreak of an infectious disease.</li> <li>➤ Exchange of information with infectious disease surveillance organizations in other countries.</li> </ul> <p><b>【Reference Services】</b></p> <ul style="list-style-type: none"> <li>➤ Storing and supplying pathogenic agents</li> <li>➤ Standardizing the reagents, preparing and supplying reference materials required for the diagnosis and surveillance of infectious diseases</li> <li>➤ Organizing communication network systems in cooperation with prefectural public health institutes</li> </ul> <p><b>【National control and other tests and research on the quality control of biological products and antibiotics】</b></p> <ul style="list-style-type: none"> <li>➤ National control tests to guarantee the efficacy, safety and homogeneity of biological products (various vaccines and blood products) for the prophylaxis, therapy and diagnosis of infectious and certain noninfectious diseases</li> <li>➤ Requested tests on biological products, antibiotics, disinfectants, insecticides, and a variety of viruses and sera</li> <li>➤ Production of reference materials, such prophylactics, diagnostic antigens, and anti-sera that are anticipated in accordance with future progress in research are being produced on a trial basis.</li> </ul>

Prepared by the investigation team

Under assignment from WHO as collaborating centers, some departments of NIID have an important international role as top reference institutes for the Western Pacific area in the isolation and identification of pathogens, epidemiological investigations and diagnosis, the preparation and supply of standard materials, improvement of diagnostic antigens, preserving and supplying type cultures, education of technicians, guidance for prevention, and information exchanges (see Table 2.3).

**Table 2.3 WHO-Designated Collaborating Centers in NIID**

Department of Bacteriology	Enteric Phage-typing Center (IUMS assigned center) Shigella/ Salmonella Center (WHO-assigned national center in Japan)
Department of Bacterial and Blood Products	Collaborating Center for the production of Immunological Products
Department of Virology I	Collaborating Center for Influenza
Department of Virology II	Collaborating Center for Enteroviruses
Infectious Disease Surveillance Center	National Serum Reference Bank
Division of Experimental Animal Research	Collaborating Center for Small Laboratory Animals

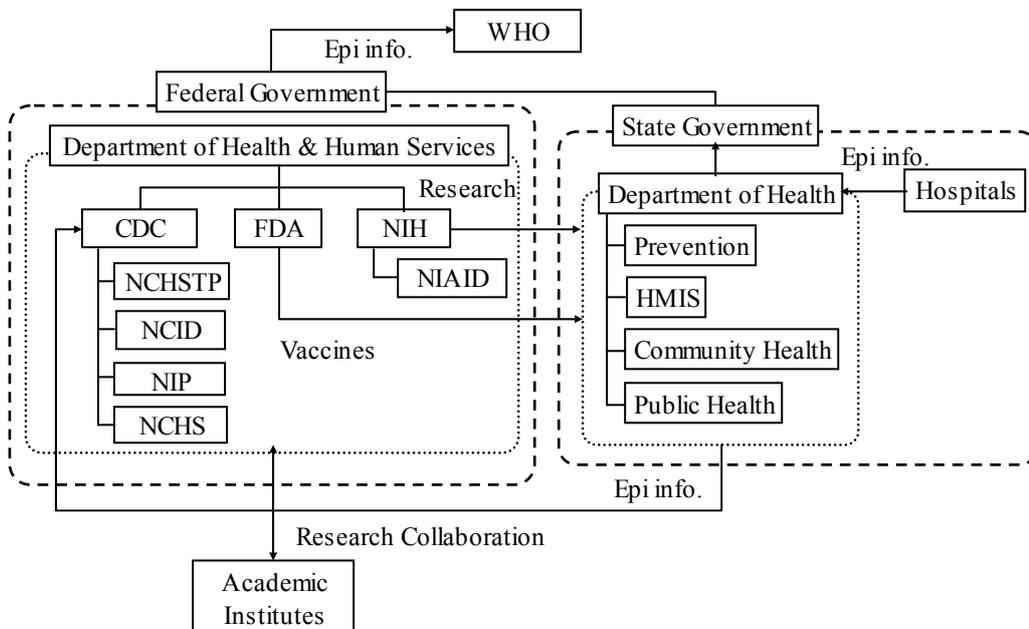
Source: NIID (2005), <http://www.nih.go.jp/niid/welcome/index.html>

## 2.2 Functions of Research Institutes for Communicable Diseases in the USA

The US Department of Health formulates primary policies to control infectious diseases, but the health care measures of one state differ from those of another, including the constitution of the laws. For this reason, each state government refers to the federal regulations as the guidelines and formulates infectious disease prevention policies that characterize the particularities of each region.

The organizational components of the Department of Health and Human Services mainly consist of the Centers for Disease Control and Prevention (CDC), which are responsible for preventing and controlling diseases, injuries, and disability; the Food and Drug Administration (FDA), which is responsible for assuring the safety of food and medicines; and the National Institutes of Health (NIH), which conduct research related to public health (see Figure 2.2).

**Figure 2.2 Interrelationship between Organizations Concerned with Communicable Diseases Control in the USA**



Prepared by the investigation team

CDC is comprised of 12 centers and institutions, such as the National Center for Infectious Diseases (NCID), the National Center for Chronic Disease Prevention and Health Protection (NCCDPHP) and the National Center for Health Statistics (NCHS). Out of 8,500 employees, over 2,000 work at health agencies or quarantine offices in each state, as well as at 10 facilities throughout the nation and 45 facilities in other countries. CDC, the leading federal agency for developing and applying disease prevention, not only for the people in the US, but also for those overseas, seeks to accomplish its mission by working with partners throughout the nation and the world.

Out of the 12 centers within CDC, the National Center for Infectious Diseases (NCID) and the National Center for HIV, STD and TB Prevention (NCHSTP) in particular undertake comprehensive measures for infectious diseases. Both centers conduct surveillance, investigations, and laboratory research, training and public education programs to develop, evaluate, and promote prevention, and control strategies for infectious diseases. There are other components, such as the National Immunization Program (NIP), which provides advice and guidance to prevent vaccine-preventable diseases, and the National Center for Health Statistics (NCHS), which provides statistical information, a vital part of the activities to prevent infectious diseases. CDC's activities to control and prevent diseases are also categorised into laboratory research, human resources development, and health care services, which are listed in Table 2.5.

**Table 2.4 Basic Concepts and Activities of CDC**

Basic Concepts	Activities
Research	<ul style="list-style-type: none"> <li>➤ Basic and applied research on infectious diseases</li> <li>➤ Development of diagnostic methods for important diseases and emerging or re-emerging diseases</li> </ul>
Human Resources Development	<ul style="list-style-type: none"> <li>➤ Technical training for overseas trainees</li> <li>➤ Planning and execution of training programs for NIH staff and domestic medical personnel</li> </ul>
Health Care Services	<p><b>【Surveillance and Information Services】</b></p> <ul style="list-style-type: none"> <li>➤ Collection of reports on the detection of infectious agents from public health institutes in rural areas and incidences of infectious diseases from sentinel clinics nationwide This information is made available to the public.</li> <li>➤ Conducting of epidemiological investigations in the event of the occurrence of an epidemic or outbreak of an infectious disease</li> <li>➤ Exchange of information with infectious disease surveillance organizations in other countries</li> </ul> <p><b>【Reference Services】</b></p> <ul style="list-style-type: none"> <li>➤ Storage and supply of pathogenic agents</li> <li>➤ Standardization of reagents, preparation and supply of reference materials needed for the diagnosis and surveillance of infectious diseases</li> <li>➤ Organizing communication network systems in cooperation with the Departments of Health in the state governments</li> <li>➤ Exchange of information with organizations in other countries</li> </ul> <p><b>【National control and other tests and research on the quality control of biological products and antibiotics】</b></p> <ul style="list-style-type: none"> <li>➤ National control tests for guaranteeing the efficacy, safety and homogeneity of biological products</li> <li>➤ Inspection for food sanitation and toxins</li> </ul> <p><b>【Promotion of Prevention】</b></p> <ul style="list-style-type: none"> <li>➤ Establishing vaccination systems, surveillance and information service</li> <li>➤ Indoor infections control</li> </ul>

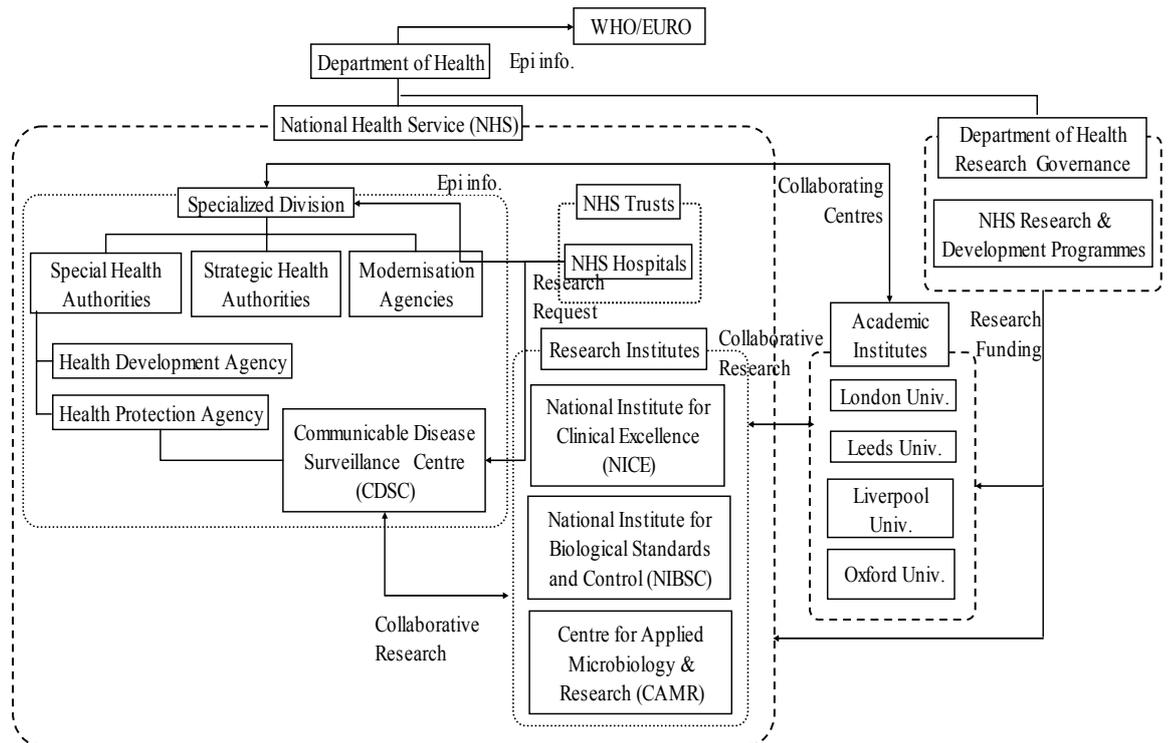
Prepared by the investigation team

### 2.3 Functions of Research Institutes for Communicable Diseases in the UK

In the UK, the Department of Health sets the national standards, controls social care services, and works with key partners (including investment decisions), and the National Health Service (NHS), which is separately run as an independent agency, is responsible for delivering the services on behalf of the Department of Health. Under the NHS, there are 28 specialized Special Health Authorities and, in 11 districts, 11 Strategic Health Authorities.

In protecting people from infectious diseases, the Health Protection Agency, one of the Special Health Authorities, plays a key role in formulating detailed policies. The Health Protection Agency collects disease information from each health institution, through the Special health Authorities, under the Strategic Health Authorities, which is submitted from the local Communicable Disease Surveillance Centre. The relationships between the organisations in the UK for the prevention of infectious diseases are shown in Figure 2.3.

**Figure 2.3 Interrelationship between the Organizations Concerned with Communicable Diseases Control in the UK**



Prepared by the investigation team

In the UK, the Communicable Disease Surveillance Centre (CDSC) functions as the main agency for preventing and controlling infectious diseases. CDSC conducts laboratory research, coordinates control measures, controls surveillance, supports national policy and provides expert advice, collaborates with other nations and provides public health information collected from the local laboratories affiliated with the Special Health Authorities (HPA) to those responsible for controlling infectious diseases.

Services and activities, such as research, human resources development, health services that contribute to the prevention and control of infectious diseases by the CDSC are listed in Table 2.6.

**Table 2.5 Basic Concepts and Activities of CDSC**

Basic Concepts	Activities
Research	<ul style="list-style-type: none"> <li>➤ Basic and applied research on infectious diseases</li> <li>➤ <u>Academic research for important diseases and emerging or re-emerging diseases</u></li> </ul>
Human Resources Development	<ul style="list-style-type: none"> <li>➤ Technical training for overseas trainees</li> <li>➤ Planning and executing of training programs for NHS staff and domestic medical personnel</li> </ul>
Health Care Services	<p><b>【Surveillance and Information Services】</b></p> <ul style="list-style-type: none"> <li>➤ Collection of reports on the detection of infectious agents from public health institutes in rural areas and the incidence of infectious diseases from sentinel clinics throughout the country. This information is made available to the public.</li> <li>➤ Conducting epidemiological investigations in the event of the occurrence of an epidemic or outbreak of an infectious disease</li> <li>➤ Exchange of information with infectious disease surveillance organizations in other countries.</li> </ul> <p><b>【Reference Services】</b></p> <ul style="list-style-type: none"> <li>➤ Storage and supply of pathogenic agents</li> <li>➤ Standardization of reagents, preparation and supply of reference materials required for the diagnosis and surveillance of infectious diseases.</li> <li>➤ Organizing communication network systems in cooperation with local laboratories affiliated with the HPA</li> <li>➤ Exchange of information with foreign organizations (WHO, CDC, developing countries, etc.)</li> </ul> <p><b>【National control and other tests and research on the quality control of biological products and antibiotics】</b></p> <ul style="list-style-type: none"> <li>➤ National control tests for guaranteeing the efficacy, safety and homogeneity of biological products (various vaccines and blood products) for prophylaxis, therapy and diagnosis of infectious and certain non-infectious diseases</li> </ul> <p><b>【Promotion of Prevention】</b></p> <ul style="list-style-type: none"> <li>➤ Establishment of vaccination systems, surveillance and information services</li> <li>➤ Indoor infections control</li> <li>➤ Maintenance of wards for infectious diseases and re-classification of the types of infectious diseases, including emerging and re-emerging infectious diseases</li> </ul>

Prepared by the investigation team

In addition, among the national research institutes in specialized fields, there are the Centre for Applied Microbiology and Research (CAMR), an applied microbiological research laboratory that undertakes research on vaccine development and pathogenic organisms, and the National Institute for Biological Standards and Control (NIBSC), an independent national biological institute responsible for controlling and evaluating biological medicine and antibiotics at the national level. These institutes work closely with the Communicable Disease Surveillance Centre (CDSC) for research and evaluation when needed.

## 2.4 Functions of Research Institutes for Communicable Diseases in Developed Countries

The roles played by the NIID in Japan, CDC in the US, and CDSC in the UK are quite similar; they conduct research and training for overseas and domestic healthcare professionals, as well as surveillance, and also set standards and provide expert advice on medicines (see Table 2.7). These activities represent the role of research institutes in controlling infectious diseases.

As mentioned above, the roles of research institutes in infectious diseases control are rather similar among the institutes, namely, the NIID in Japan, CDC in USA and CDSC in the UK. Unlike the CDC and CDSC, the NIID does not undertake the role of prevention as one of its basic concepts. In fact, the Infectious Disease Information Centre, a division of NIID, conducts activities related to prevention, such as integrated research on the effectiveness of vaccinations, monitoring and reporting on the effects and sub-reactions to vaccinations, and so on. However, these activities are classified into research, surveillance services, reference services, and national control and other tests. The prevention activities of CDC and CDSC are also classified in a similar way.

This confirms that, in addition to research activities, these three institutes conduct training for medical personnel both in and outside the country, surveillance services, reference services and national control and other tests (see Table 2.7).

**Table 2.6 Functions of Each Research Institute in Communicable Diseases Control**

	NIID (Japan)	CDC (USA)	CDSC (UK)
<b>【Research】</b>			
Research	○	○	○
<b>【Capacity Development】</b>			
Training	○	○	○
<b>【Health Services】</b>			
Surveillance	○	○	○
Reference	○	○	○
National control and other tests	○	○	○

Prepared by the investigation team

In the evaluation study, the functions of research institutes in Ghana, Kenya, and Zambia will be examined based on these general functions, derived from this analysis of research institutes for infectious diseases in Japan, the USA, and the UK.

## **Section 2**

# **Evaluation Analysis**

## **Section 2 Evaluation Analysis**

### **3 Trends in Japanese Cooperation with Research Institutes for Communicable Diseases**

In Africa, 17 nations successively became independent during the 1960s, which is referred to as the era of the “Independence of African Nations”, set off by Ghanaian independence in 1957. However, African nations immediately after independence suffered from various problems including development issues, conflicts, infectious diseases, and so on, which remain major challenges to this day. Japanese Official Development Assistance (ODA) commenced from 1954, around the same time as the Independence of African Nations, but with the focus on support to the Asia region. In Africa, JICA started extending technical cooperation to the Korle Bu Hospital, Ghana College of Health Services (later the Noguchi Memorial Institute for Medical Research), which is regarded as the forerunner of Japanese development assistance to Africa. Subsequently, technical cooperation with the Kenya Medical Research Institute began, while Japanese assistance to Africa rose sharply in order to implement the first ODA-doubling plan.

Even in the 1980s, a “Lost Decade” during a time of severe economic crises in Africa, Japanese ODA to Africa steadily rose from US\$223 million in 1980 to US\$884 million in 1988. Technical cooperation with the Zambia University Teaching Hospital was launched around the same time. Subsequently, support for African nations, including cooperation in the health and medical sector, expanded under the agreements made by the international community at the first Tokyo International Conference on Africa Development (TICAD I), which jump-started the expansion of assistance to Africa. In addition, as can be seen in the declaration of the Global Issues Initiative on Population and AIDS (GII) in 1994 and the Okinawa Infectious Diseases Initiative (IDI) in 2000, support for infectious diseases control in developing countries came to be focused on by the international community.

A general description of cooperation extended to NMIMR, KEMRI, and UTH is shown in Table 3.1, which functions as the base of support for infectious diseases control through Japanese cooperation.

**Table 3.1 Trends in Japanese Cooperation for Research**

Year	'65	'70	'75	'80	'85	'90	'95	'00	'05
Notable Events	Independence of African Nations	Development based on BHN		"Lost Decade"		TICAD I TICAD II		TICAD III IDI	
<b>Ghana</b>	<b>Korle Bu Hospital (Dispatch of experts)</b> <ul style="list-style-type: none"> <li>➤ Virology and Electron microscope</li> <li>➤ Undernutrition and Infectious diseases</li> <li>➤ Pathologic physiology and Undernutrition</li> <li>➤ Diarrhea and Undernutrition</li> </ul>			<b>NMIMR Project</b> <ul style="list-style-type: none"> <li>➤ Virology</li> <li>➤ Epidemiology</li> <li>➤ Nutrition</li> </ul>		<b>NMIMR Project • F/U</b> <ul style="list-style-type: none"> <li>➤ Vaccines</li> <li>➤ Diarrhea</li> <li>➤ HIV/AIDS</li> <li>➤ Schistosomiasis</li> </ul>		<b>Infectious Diseases Control Project</b> <ul style="list-style-type: none"> <li>➤ HIV/AIDS/STD</li> <li>➤ Tuberculosis Control</li> <li>➤ VPD</li> <li>➤ Schistosomiasis</li> </ul>	<b>WASIPAC</b> <ul style="list-style-type: none"> <li>➤ Parasitic Diseases Control</li> <li>➤ ICTP and TCTP</li> </ul>
<b>Kenya</b>				<b>Communicable Diseases Research and Control Project</b> <ul style="list-style-type: none"> <li>➤ Viral Diarrhoeal Diseases</li> <li>➤ Bacterial Diarrhoeal Diseases</li> <li>➤ Parasites</li> </ul>	<b>Project of KEMRI</b> <ul style="list-style-type: none"> <li>➤ Viral Diarrhoeal Diseases</li> <li>➤ Bacterial Diarrhoeal Diseases</li> <li>➤ Parasites</li> </ul>	<b>Project on the Research and Control of Infectious Diseases</b> <ul style="list-style-type: none"> <li>➤ Viral Diarrhoeal Diseases</li> <li>➤ Bacterial Diarrhoeal Diseases</li> </ul>	<b>Research and Control of Infectious Diseases II</b> <ul style="list-style-type: none"> <li>➤ HIV/AIDS</li> <li>➤ ARI</li> <li>➤ Viral Hepatitis</li> </ul>	<b>Research and Control of Infectious and Parasitic Diseases Project</b> <ul style="list-style-type: none"> <li>➤ HIV/AIDS</li> </ul>	<b>Research and Control of Infectious Diseases Project</b> <ul style="list-style-type: none"> <li>➤ HIV/AIDS</li> </ul>
<b>Zambia</b>						<b>Infectious Diseases Project Phase I • F/U</b> <ul style="list-style-type: none"> <li>➤ Establishment of the diagnostic methods</li> <li>➤ Nosogenesis analysis from patient samples</li> </ul>	<b>Infectious Diseases Control Project</b> <ul style="list-style-type: none"> <li>➤ Enhancement of diagnostic techniques</li> <li>➤ Epidemiological and clinical research</li> <li>➤ Strengthening surveillance</li> </ul>	<b>HIV/AIDS and TB Control Project</b> <ul style="list-style-type: none"> <li>➤ Improvement of diagnosis quality, data management and laboratory management</li> <li>➤ Introduction of diagnosis and surveillance techniques for HIV/AIDS and TB</li> </ul>	

Prepared by the investigation team

## **4 Analytical Findings on the Noguchi Memorial Institute for Medical Research in Ghana**

In this chapter, first of all the background and an outline of cooperation with the Noguchi Memorial Institute for Medical Research are given in section 4.1 Summary of JICA Cooperation with the NMIMR, and based on the field survey the positioning and functions of the NMIMR in relation to communicable diseases control in Ghana comprise four sections, and an analysis of the contribution of the Noguchi Memorial Institute for Medical Research (NMIMR) is presented in relation to infectious diseases control and the effects of JICA's cooperation that made possible this contribution of the NMIMR. Section 4.2 provides an outline of infectious diseases control in Ghana, including the functions and roles of the NMIMR. Based on these findings, the effects of JICA cooperation that enabled the NMIMR to contribute to infectious diseases control are analysed and described in section 4.3. The results of the analysis are summarized in section 4.4 as the expected role of the NMIMR.

### **4.1 Summary of JICA Cooperation with the NMIMR**

#### **4.1.1 Background History to the Cooperation**

Following its independence in 1957, former President Nkrumah carried out major reforms under the banner of Pan Africanism that targeted economic development, the promotion of education, and public health improvements. However, Ghana's mortality rate for children under five years of age was extremely high at 215 deaths per 1,000 infants due to infectious diseases, notably tuberculosis (TB), measles, smallpox, pneumonia, and malaria. Malnutrition was another major cause of the high mortality rate.

The Government of Ghana (GoG) judged that there was a need to improve nutritional and other environmental conditions and to conduct virological research to protect the population of Ghana. Thus, the GoG requested the Overseas Technical Cooperation Agency (OTCA), the predecessor of JICA, to dispatch experts to the Korle Bu Hospital (Ghana College of Health Services). Based on this request, OTCA dispatched experts from 1968. In 1969, the Ghana College of Health Services became a part of the University of Ghana and Japan continued to dispatch experts to the Korle Bu Hospital until 1978.

In 1977, the Ghanaian Government enacted a plan to establish a medical complex comprising a Basic Medical Sciences Department, Undergraduate Medical School, Teaching Hospital, Postgraduate Medical Institute, Paramedic Training School and other units at the University of Ghana in the Legon district, in the capital, Accra. Based on a request from the GOG, the Japanese government provided grant aid assistance, "Project for Construction of the Postgraduate Medical Research Institute, University of Ghana, Medical School" (Phase1-2), to establish the Noguchi Memorial Institute for Medical Research (henceforth referred to as the NMIMR) as a postgraduate research institute in the complex.

After the completion of the facilities of the NMIMR, technical cooperation provided at the Korle Bu Hospital was transferred to the institute. JICA continued to dispatch experts to enhance the research capacity and organizational structure of the NMIMR,

and it began project-type technical cooperation<sup>1</sup> following a request by the GOG to improve the technical capacity of the NMIMR in virology, epidemiology, and nutrition. JICA has continuously cooperated with the NMIMR to improve its research capacity over a period of 28 years. Meanwhile, the Japanese government has supported the development of the facilities and equipment of the NMIMR through the execution of grant aid projects, such as the Noguchi Memorial Institute Rehabilitation and Extension Project in 1997 and so on.

#### **4.1.2 Outline of the NMIMR**

##### **(1) Mandate of the NMIMR**

The NMIMR was established by the Council of the University of Ghana in 1979 as a semi-autonomous institute of the university. According to the annual report of the NMIMR, the institute's mission is to become a centre both for the training of researchers, as well as for tackling and solving the myriad medical problems facing the country. It aims at becoming a centre of excellence for research into diseases of importance for public health, especially in Ghana, and to contribute to human resources development for scientific research and the health services.

The broad objectives and mandate of the NMIMR are:

- i) To research into the problems of communicable diseases and malnutrition;
- ii) To provide training opportunities for post-graduate students in medical research;
- iii) To provide specialized diagnostic and monitoring services in support of public health programmes.

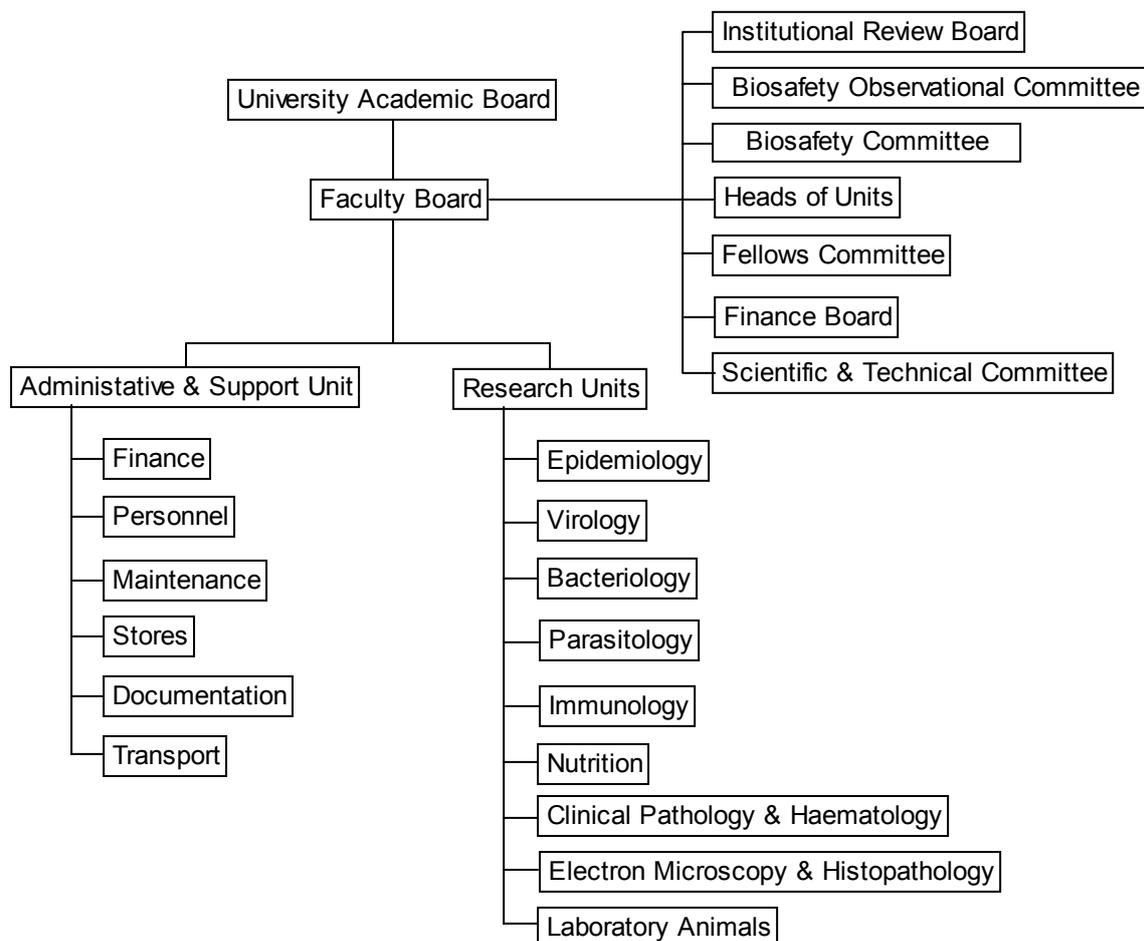
##### **(2) Organizational Structure of the NMIMR**

As a research institute under the jurisdiction of the University of Ghana, the Council of the University of Ghana and various committees manage the NMIMR. The internal organization of the NMIMR consists of six major administrative sections and research departments (nine units covering eleven fields) with the Faculty Board playing a central role (see Figure 4.1).

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1 To strengthen its cooperative approach for each country and region, JICA has integrated all technical cooperation schemes, project-type technical cooperation, the dispatch of individual experts, the provision of equipment and the acceptance of trainees in Japan under the category of technical cooperation projects from 2002. In this report, the terminology that was used for cooperative activities prior to 2002 has been used for projects implemented during that period and all activities after 2002 are referred to as technical cooperation projects.

**Figure 4.1 Organizational Chart of the NMIMR**



Prepared by the investigation Team

The head of each research unit is responsible for planning and implementing research plans. The staff members of each unit include research fellows, research assistants, technicians, and other staff.

### 4.1.3 Outline of JICA’s Cooperation with the NMIMR

#### (1) Objectives and Components of JICA’s Cooperation

Based on the results of studies, the objectives of the series of JICA cooperation activities can be roughly divided into two stages. During the initial stage from 1968 to 1991, JICA focused on strengthening the capabilities of university-affiliated institutions. Although the first project-type technical cooperation, the Noguchi Memorial Institute Project, which started in 1986, included some activities related to infectious diseases control, such as the quality control of vaccines, its main objective was to transfer technical skills to the NMIMR. The second stage started in 1991 after “Noguchi Memorial Institute Project Phase II”. This stage aimed to strengthen the research capabilities of the NMIMR and to enhance the capacity of health/medical personnel through technical training. This stage intended to enhance and strengthen

infectious diseases control in Ghana through capacity building for the health/medical personnel based on the NMIMR, which had acquired the appropriate research capabilities during the period of the first stage of JICA technical cooperation.

As shown in Table 4.1, JICA dispatched experts to the Korle Bu hospital and the NMIMR over a period of 18 years from 1968 to 1985. As of July 2004, when this evaluation study was being carried out, JICA had implemented a total of four project-type technical cooperation activities since 1985. In addition to technical cooperation, since 1991, JICA has implemented third-country training programmes (TCTP) three times with the NMIMR as a counterpart institution. This evaluation study considers these technical cooperation and third-country training programmes to be part of the series of assistance activities for the NMIMR, and hence this evaluation is conducted accordingly.

**Table 4.1 Target Projects for Evaluation**

Project title	Scheme	Execution (fiscal years)
Dispatch of individual experts	TCP	1968.07~1985.03
Noguchi Memorial Institute Project	TCP	1986.10~1991.09
Noguchi Memorial Institute Project Phase II and F/U	TCP	1991.10~1997.09
Infectious Diseases Project at the Noguchi Memorial Institute for Medical Research	TCP	1999.01~2003.12
West African Centre for International Parasite Control Project	TCP	2004.01~2008.12
Vaccine Potency Testing and Polio Diagnosis Procedures	TCTP	1991~1995
Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases (Polio and Measles)	TCTP	1996~1998
West African Centre for International Parasite Control	TCTP	2004~2008

Legend: TCP Technical Cooperation Project

TCTP Third-Country Training Programme

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The components of JICA's cooperation are summarised in Table 4.2.

**Table 4.2 Components of JICA's Technical Cooperation with the NMIMR**

	68	70	75	80	85	90	95	00	04
Main changes in the health sector in Ghana			Preparatory period for introducing vaccination Introduction of vaccination Introduction of PHC policy	Execution of Intensive mass immunization campaign Establishment of National Technical Committee on AIDS	Establishment of National Vaccination day Start of the national TB control program Beginning of National Institutional Renewal	Start of the health SWAp		WACIPAC School-based parasitic diseases control ICTP & TCTP	
JICA Technical Cooperation Projects		Korle Bu Hospital		Virology and Electron Microscope (1968-73) Viral and Parasitic Diseases of the Eye (1973-76) Pathology and Immunology of Tropical Diseases (1976-80) Aetiology and Control of Diarrhoeal Diseases and Malnutrition (1980-86)		NMIMR Project Virology Epidemiology Nutrition	NMIMR Project II Vaccines Diarrhoea HIV/AIDS Schistosomiasis	Infectious Diseases Project HIV/AIDS & STD TB control VPD Schistosomiasis	
Third-Country Training Programme							Vaccine and Polio	Yellow Fever/ Polio	WACIPAC
Grant Aid			Construction of a Laboratory	Power grid maintenance			Improvement of the Laboratory		
Objectives of the JICA Programme				Capability Building at the NMIMR					
Role of the NMIMR in the country / Africa region.				Research institute of the University National Reference Lab. for HIV			Human Resources Development in the Health Sector International Research Institute WHO Regional Reference Laboratory. for Polio		

Prepared by the investigation team

## **(2) Components of JICA Cooperation according to the Diseases**

As shown in Table 4.2, each project targeted several diseases and research on specific diseases occurred over a period covering several projects. In consideration of this situation, project activities were rearranged on the basis of the incidence or occurrence of diseases.

A series of JICA technical cooperation targeted Vaccine/Vaccine Preventable Disease (VPD), HIV/AIDS and Sexually Transmitted Diseases (STD), Diarrhoeal Diseases, TB, and Schistosomiasis. The components of JICA technical cooperation are summarized below: (the activities of each project, inputs by JICA such as the dispatch of experts, C/P training and equipment provision are described in the Annexes).

### **1) Vaccines/VPD**

In Ghana, a full-scale vaccination program was started in 1976, although the low vaccination rate and the deterioration in vaccine quality became a problem.

The NMIMR started activities related to the quality control of vaccines, vaccine potency testing for polio, measles and yellow fever, and the effectiveness of cold chains for vaccines from 1986. In addition, clinical trials of the heat stable Acellular Pertussis Diphtheria Tetanus (APDT) vaccine were also carried out in three communities in the Gomoa district from 1991.

This research was discontinued after the conclusion that the NMIMR had acquired the necessary technology for the quality control of vaccines at the end of the Noguchi Memorial Institute for Medical Research Project Phase II in 1997. Then new research on serologic testing to examine viral hemorrhagic fever was started from 1999.

### **2) HIV/AIDS·STD**

Forty-two AIDS patients were reported for the first time in Ghana in 1986, and the total number of the AIDS patients was 10,285 by 1992 with the number of HIV-carriers estimated at 150,000. It was estimated that there was an average 3.6% prevalence rate as a result of a sentinel survey conducted in 2003.

JICA recognises that HIV/AIDS is a critical disease, and started to include research activities on HIV/AIDS from 1991. Initially, the establishment of diagnostic methods, infection routes and mother-to-child transmission (MTCT) were the primary focus. However, JICA took the next step to establish a standardized diagnostic method and the preparation of a manual in cooperation with the Ministry of Health (MOH). In addition, JICA worked to establish testing techniques for detecting trachoma, one of the most prominent STDs in Ghana.

As JICA cooperation included research on dangerous infectious agents such as HIV/AIDS and drug resistant TB bacteria, a high security laboratory (P3 lab) was also established using grant aid from the Government of Japan. In tandem with this, a biosafety committee to manage the P3 lab in order to handle dangerous infectious agents was established, and biosafety countermeasures were also established at the NMIMR.

### **3) Tuberculosis (TB)**

In 1991 the GOG started full-scale TB control, and thus a National TB Control Programme (NTP) was established in 1994. The NTP conducted training for TB laboratory from 1994 to 1995 with financial support from DANIDA. However, the MOH and DANIDA reviewed the NTP in 1998, and pointed out that TB speculum services were the weakest component of the DOTS Control Strategy in Ghana. Nevertheless no assistance to TB control was being provided by other donor agencies after the termination of financial assistance by DANIDA for the training of microscopy centres from 1994 to 1995, since many donor agencies had pooled their funds into a health fund under the Sector-wide Approaches (SWAs).

Through the establishment of the role of the NMIMR as a reference laboratory, JICA started to improve its capacity in order to enhance the poor state of the TB speculum centers that was pointed out by the MOH and DANIDA. The required techniques for smear preparation, culture, mycobacterium species identification, and drug susceptibility testing were transferred at first since the Bacteriology Unit of the NMIMR had no facilities, equipment or experience in TB diagnosis in those days. Subsequently, activities to establish external quality assurance were conducted. The NMIMR trained 30 experts from 10 regional hospitals in Ghana, and a national TB speculum quality assurance manual was prepared and submitted to the NTP.

### **4) Parasite Control**

#### **a. Schistosomiasis**

Schistosomiasis prevalence in Ghana erupted when the Lake Volta was constructed to provide a dammed lake for the Akosombo hydroelectric power station. The prevalence of this disease, which until then was only observed in certain areas, has now spread to many communities along the Lake Volta.

With cooperation from JICA, the NMIMR conducted studies on schistosomiasis in eight villages along the Densu River. This study included parasite control using chemotherapy, and facilities for safety water supply were built. These activities in the villages were terminated in 1997, and the development of a potential vaccine candidate molecule(s) was conducted from 1999 to 2003.

#### **b. International Parasite Control**

The Japanese government submitted a proposal (Hashimoto initiative) at the Birmingham G7 Economic Summit in 1998 to establish centres to foster personnel and to create a network in Asia and Africa aimed at strengthening international countermeasures to deal with human parasites. Three centres in Thailand, Kenya, and Ghana were proposed. Based on the proposed plan, the Asia Centres of International Parasite Control was established in Thailand in 2000, the Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC) was established in Kenya in 2001.

In Ghana, the Infectious Diseases Control Project launched a package of third-county training for de-worming activities through school health education. Then, the GOG and the Government of Japan agreed to establish the West African Centre for

International Parasite Control (WACIPAC), which was designated as a technical cooperation project, and was started in January 2004.

### **5) Improvement of Public Health Care**

In cooperation with JICA, the NMIMR conducted field surveys for EPI, malaria and diarrhoeal diseases in four villages from 1986 to 1991. In addition, the NMIMR also conducted a series of activities to improve primary health care such as health education, vaccination sessions, treatment of childhood diseases and child birth delivery systems, etc too. A health facility was also established as a part of the activities.

### **6) Malaria**

Malaria is a parasitic disease and has the highest prevalence rate for diseases in Ghana. In the Central region, Volta region and Brong Ahafo region, JICA conducted studies on malaria that aimed to find out the sensitivity status of *Plasmodium falciparum* to chloroquine and other anti-malaria drugs. In addition, malaria infection, morbidity and antibody levels in infants were studied in the Fetteh, Onyadze/Otswe, Jukwa and Mprumen villages in Gomoa.

However, JICA's cooperation activities on malaria closed down in 1991 after the termination of the Noguchi Memorial Institute Project. The NMIMR has continued to conduct research activities on malaria control, including the level of drug resistance, in cooperation with WHO/TDR, NIH, EU, Welcome Trust and the US Navy.

### **7) Diarrhoeal Diseases**

Diarrhea is the next greatest ailment that plagues the population of Ghana following malaria and respiratory diseases, and infant health countermeasures against diarrhea have been widely adopted. JICA's cooperation activities related to research on diarrhea were implemented from 1980 to 1997. Initially, the pathogen was identified followed by work to clarify the causes and work to prepare oral re-hydration salts (ORS) using materials that could be supplied domestically.

## **4.2 Outline of Communicable Diseases Control in Ghana**

An outline of infectious diseases control in Ghana is given below to clarify the roles and functions of the NMIMR as a research institute for infectious diseases control in Ghana.

### **4.2.1 Diseases Structure**

The epidemiological situation in Ghana is similar to other sub-Saharan countries. The predominant diseases are communicable diseases such as malaria, respiratory diseases, diarrhoea, and parasites, with malnutrition and anaemia also prevailing. Malignant neoplasm, diabetes and cardiovascular diseases that are often observed in the disease patterns of developed countries are also increasing rapidly

Among infectious diseases, malaria is the most important cause of mortality and morbidity. It is reported by the MOH that 40% of outpatients in public health facilities are infected with malaria, and almost 20% of child deaths are caused by malaria. In addition, less than 50% of the population in rural areas have access to safe water. As a result, diarrhoeal diseases are still a major cause of mortality and cholera often re-emerges in the rainy season.

TB accounts for 250,000 new cases each year in combination with HIV/AIDS, and the MOH has reported that almost half of the adult population have experience of being infected. The sentinel survey in 2003 indicates an average national HIV prevalence of 3.6%. Under these circumstances, the priority targets for Ghana are malaria, TB and HIV/AIDS.

On the other hand, there are outbreaks of yellow fever and cerebral meningitis in the northern regions. Guinea Worm Disease is a target for elimination among parasitic diseases. Water borne infectious diseases such as leishmaniasis, schistosomiasis and onchocerciasis are also problems.

### **4.2.2 Communicable Diseases Control by the MOH**

#### **(1) Development Plan for the Health Sector**

The MOH conducted its “First Five-Year Health Sector Programme 1997-2001” based on Ghana's Comprehensive Program of Economic and Social Development (known as Vision 2020). In 2002, the GOG formulated the Ghana Poverty Reduction Strategy (GPRS) as the actual national development plan. The “Second Five-Year Health Sector Programme 2002-2006” is based on the GPRS; it considers that improving the health of the poor is crucial for reducing poverty, especially the poverty gap between the wealthy southern coastal area including the capital and the northern depopulated desert area. Therefore, the activity plan addresses the control of infectious disease as a priority target. Table 4.3 shows the priority targets to be achieved.

**Table 4.3 Targets to be Achieved by the Second Five-Year Health Sector Programme**

Priority Target	Measures	2000	GPRS (2004)	2nd 5-Year Programme (2006)
Health Status	U5MR per 1,000	107.6	95	95
	IMR per 1,000	56.7	50	50
	MMR per 100,000	214	160	160
	Life expectancy	58	58	58
HIV/AIDS/STI: HIV/AIDS control in health sector	HIV prevalence	3	3	2.6
Malaria: Strengthening malaria control	Percentage use of ITN for pregnant woman and U5MR			
Tuberculosis: DOTS strategy	Cure rate Case detection rate	43%		60%
Guinea Worm Disease: Elimination of Guinea worm	Number of cases	7,402	0	0
Strengthen EPI and Eradication of Polio		—		
Reproductive Health	Ante natal care	47		70
Mother and Child Health	Coverage, % with supervised delivery	44		50
	Family planning	14.3		40
Surveillance: clinical, pharmaceutical and laboratory practice	Percentage meeting international quality standards	66%		80%

Source: Government of Ghana (2003), Ghana Poverty Reduction Strategy Ministry of Health (2001), Second 5-Year Health Sector Programme of Work 2002-2006

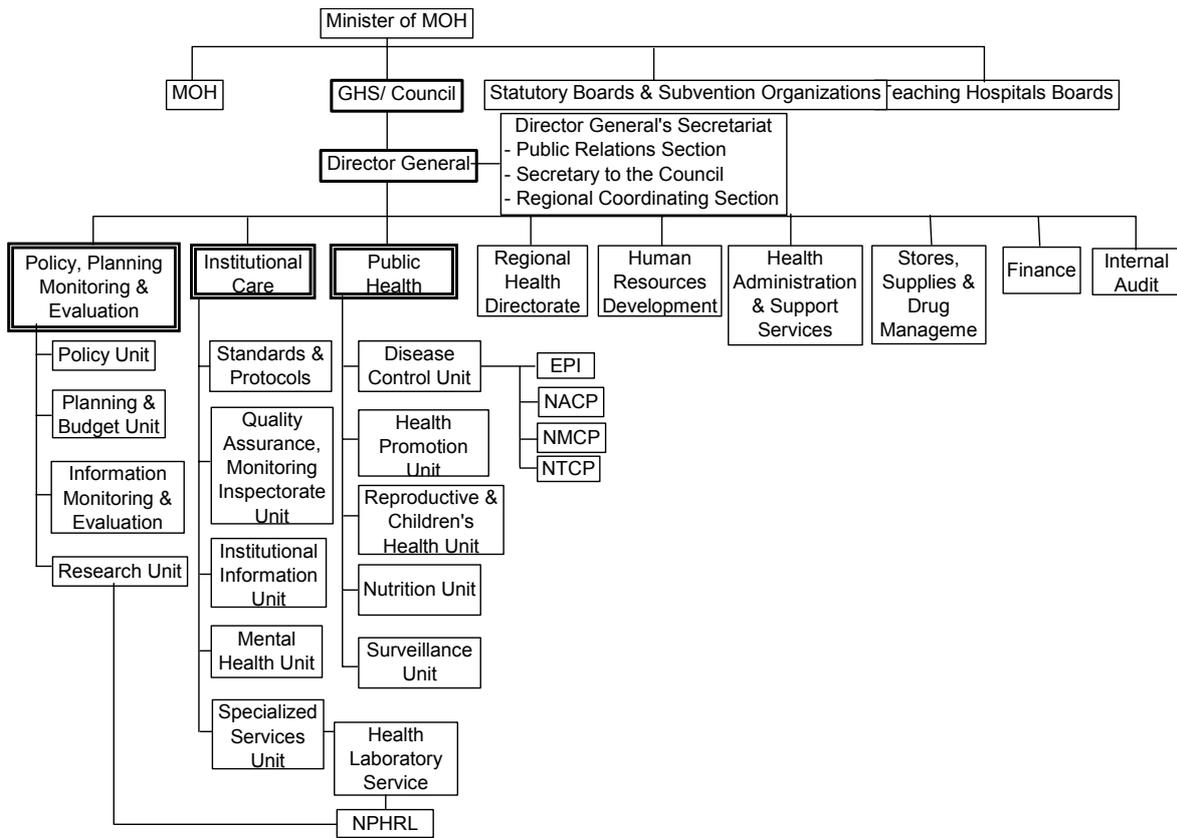
The Second Five-Year Health Sector Programme sets forth specific target indicators; to reduce the rate of infant/child mortality by two-thirds by 2015; to cut the rate of maternal mortality by three-quarters by 2015; to reduce the HIV infection rates by 25% among those 15-24 years old by 2015, and to decrease TB and malaria mortality by 50% by 2010.

## (2) Implementation System for Communicable Diseases Control

Based on the health reforms introduced by the GOG in 1996, the MOH was separated into two independent entities, namely the MOH, which is responsible for policy legislation, budget appropriation and allocation, and ordinances and the Ghana Health Service (GHS), a policy implementation agency. The GHS created health divisions in each regional administrative district and is responsible for implementing national health policies.

The Disease Control Unit of the Public Health Division in the GHS is implementing a special program mentioned before to combat malaria, TB, and HIV/AIDS. In addition, the Health Surveillance Unit prepares health statistics based on epidemiological data collected from health facilities. The Health Research Unit conducts the research (including on non-infectious diseases) that is needed to implement the programs (see Figure 4.2).

**Figure 4.2 Organizational Chart of the GHS**



Prepared by the investigation team

All of the laboratories under the jurisdiction of the MOH are supervised by the Institutional Care Division of the GHS. However, the NPHRL, the foremost public health reference laboratory under the jurisdiction of the MOH, is supervised by both the Institutional Care Division and the Public Health Division of the GHS.

The first screening for tests and examinations is undertaken at the hospital and clinics and the results are sent to the NPHRL. As the reference laboratory, the NPHRL retests the samples if necessary. However, tests for polio, yellow fever, TB, and Buruli ulcer are conducted at the NMIMR. The CD4 counts and viral load analysis for HIV/AIDS are also carried out by the NMIMR as the country's foremost public research laboratory. The NMIMR also retests, identifies, and diagnoses samples that the NPHRL is unable to handle.

### (3) National Communicable Diseases Control

As mentioned above, the Disease Control Unit of the Public Health Division in the GHS is implementing special programs to combat malaria, TB, and HIV/AIDS. The contents of each program are as follows:

## 1) Malaria Control

In 1992, the MOH initially developed the “National Malaria Action Plan 1993-1997”. Within the adoption of the “Roll Back Malaria” Initiative in 1998, the MOH formulated a “Medium Term Strategic Plan for Malaria Control in Ghana 1998-2001” to improve the coverage of malaria control activities by adopting an inter-sectoral approach involving other government sectors and partnership with the private sector and twelve communities.

There is limited information and material on the resistance of the malaria vector to insecticides in Ghana. The availability of nets is limited due to the fact that there is no in-country manufacturing capacity in Ghana. Bed net usage varies widely from 4.4% in northern areas to 50-80% in southern areas. Thus, the use of insecticide-treated mosquito nets (ITN) is a major intervention promoted under the Medium Term Strategic Plan for Malaria Control, and ITN promotion between the MOH and the commercial sector has developed. There is a report from an NGO that deals with ITN provision under a UNICEF program which states that more than 50% of households spend some money on anti-mosquito measures, such as coils and aerosols, when they are aware of ITN. For example, when they find dead mosquitoes beside the net in the morning.

## 2) AIDS Control

Since the first HIV/AIDS case was detected in Ghana, the HIV/AIDS epidemic seems to have spread slowly but steadily. Accordingly, in 1987, the GOG established the Ghana National AIDS/STI Control Programme under the Disease Control Unit of the MOH to be responsible for issues related HIV/AIDS. However, in the absence of a multi-sectoral arrangement, the NACP has not been able to reach its goals due to the extensive demands on it. In 2002, the Ghana AIDS Commission (GAC) was established under the leadership of the president to coordinate the implementation of a multi-sectoral response.

According to the results of the HIV sentinel survey by the NACP, the mean prevalence rate of the population aged 15 to 49 years has fluctuated between 2.8 and 3.9%. The implementation of the “National Strategic Framework on HIV/AIDS for 2001-2005” by the GAC consists of the following five key areas of intervention.

- Prevention of new transmission
- Care and support for people living with HIV/AIDS
- Reducing individual and societal vulnerability and susceptibility to HIV/AIDS through the creation of an enabling environment
- Decentralized implementation and institutional arrangements
- Research, monitoring and evaluation

To achieve these objectives, activities have recently been launched for the prevention of mother to child transmission (PMTCT) and Anti-Retroviral Treatment (ART) for opportunistic infections in Voluntary Counselling and Testing (VCT) centres. This framework also considers the human rights of females and children in accordance with

the high prevalence rate among females. In addition, it is also concerned with mutual health promotion between HIV/AIDS and malaria control programs due to the high risk of malaria transmission from HIV/AIDS carriers.

### **3) Tuberculosis Control**

Ghana has been ranked as having the highest prevalence rate for TB of any endemic country and is at the 13th position among African countries according to the established number of TB cases reported to WHO. The report of the MOH mentions that 6,407 new cases were found in 1990 and this number increased to 10,449 in 1996. It is assumed that the factors causing this growth are malnutrition, overpopulation, deterioration in sanitation conditions, drug resistance and HIV-positive pulmonary TB cases. The implementation of the National Tuberculosis Control Programme started in 1994, and the emphasis of this program is on the early diagnosis and treatment of smear-positive pulmonary patients who are a major source of infection in the community. Currently, the Tuberculosis Control Strategic Plan for Ghana is operated as major program under the Second Five-Year Health Sector Programme 2002-2006. Main objectives are as follows:

- Detect 70% of TB cases and, of these, attain at least a 85% cure rate among all cohorts of smear-positive cases enrolled in short-course chemotherapy.
- Decrease the prevalence rate and mortality rate of tuberculosis by 50% by 2010.
- Eliminate the threat of TB threat by 2050.

### **4) Guinea Worm Eradication**

Ghana has the second highest prevalence rate of Guinea Worm Disease (GWD) next to Sudan. Thus, a guinea worm eradication programs was launched in 1987 by the MOH, and the major activities/interventions that have been carried out are as follows.

- House to house surveillance for guinea worm cases by village volunteers
- Case management, including occlusive bandaging and worm extraction
- Filter distribution and/or replacement
- Abatement application for treatable water sources
- Health education
- Training of volunteers and health workers (case management, filter use)

Despite these actions, the number of GWD cases has increased due to re-infection over the last few years; from 4,739 in 2001 to 5,611 in 2002. This situation is quite worrying and demands concerted effort through inter-sectoral policy making.

## **5) EPI Programme**

After the MOH formulated the Universal Childhood Immunisation Programme in 1984, the vaccination rate rose from approximately 60% to over 80% currently. Vaccination in childhood has become a part of the Integrated Management of Childhood Illness (IMCI) activities since 1996, and new strategies such as vaccination for infants and combination with vitamin A provision on national immunization days (NIDs) for polio have been strengthened. In addition, measles and neonatal tetanus are mentioned as an objective of EPI and NID.

## **(4) Implementation Structure for Research on Infectious Diseases**

Table 4.4 lists four other research institutes for infectious diseases control under the jurisdiction of the MOH.

**Table 4.4 Research Institutes for Infectious Diseases Control in Ghana**

Organization	Activities
National Public Health Reference Laboratory (NPHRL)	<p>The NPHRL belongs to the Public Health Division and Institutional Care Division of the GHS. NPHRL is positioned as the central top referral laboratory and manages health information referred from district laboratories. The NPHLS has three of its own public health laboratories (PHLs) in Kumasi, Tamale and Sekondi -Takundi to collect data and prepare samples to send to the NPHLS.</p> <p>The NPHRL and these three PHLs are not equipped with sophisticated diagnostic apparatus, therefore the NMIMR is charged with advanced research. Thus, there is a clear research demarcation between the NPHRL and the NMIMR. For example, on HIV/AIDS testing, the NPHRL works on rapid tests and the ELIZA method on the national HIV/AIDS screening, and the NMIMR conducts examinations using CD4 counting and PCR for virus determination. The NPHRL is defined as the national reference laboratory for TB too. However, the NMIMR conducts most of the work of the national reference laboratory due to the insufficient number of staff members and inadequate facilities of the NPHRL.</p>
Health Research Unit (HRU)	<p>The HRU was set up by the MOH in 1990, and belongs to the Policy, Planning Monitoring and Evaluation of the GHS. The primary mandate of the unit is to coordinate and conduct research into health issues to facilitate policy formulation and program implementation. Also the training of technologists and monitoring and evaluation of programs are part of its task. The HRU has three field research centres, but these centres are not equipped with a laboratory, so they are more or less district branch offices of the HRU. Hence, the HRU coordinates with in-country research and academic institutions such as the NMIMR, KCCR in Kumasi and the School of Medicine at Ghana Univ. to obtain field data and research outputs. The major task of the HRU is to prepare data and strategic papers that translate research into policy</p>
Centre for Scientific Research into Plant Medicine (CSRPM)	<p>The CSRPM has three research divisions for botanical specimens, plant sciences, and pharmacology. It conducts research on pharmaceutical products from herbs and plants and identifies plants of medicinal and scientific importance.</p> <p>The CSRPM researches the efficacy of traditional, herbal preparations for the treatment of opportunistic infections and malaria therapy working in collaboration with the NMIMR. The CSRPM is also supplied with experimental animals from the NMIMR.</p>
Onchocerciasis Chemotherapy Research Centre (OCRC)	<p>The OCRC was established in Hohoe, Volta Province, to conduct research on onchocerciasis. The OCRC cooperates with the University Ghana and the Bernhard-Nocht Institute in Germany who assists KCCR on the topic of onchocerciasis treatment.</p>

Prepared by the investigation team

The NPHRL is the focal research institute behind Ghana's infectious diseases control programs. However, as explained earlier, a realistic approach has been adopted to eradicate each disease based on the technical levels and implementation system of the NPHRL and the NMIMR. Although the HRU is also a research institute, it is mainly involved in conducting administrative tasks related to commissioning research work from outside research institutions. The CSRPM and the OCR are both involved in specialized fields and their activities do not overlap with other research institutions.

Thus, work on infectious diseases control is appropriately demarcated. The NMIMR is assigned as a reference laboratory for HIV/AIDS, polio and TB, and is also a responsible institute for EQA of HIV and TB testing. Thus, the research activities of other institutions do not overlap with those of the NMIMR.

### **4.2.3 Assistance provided to Communicable Diseases Control by Other Donors**

#### **(1) Type of Assistance**

There are three types of other donor assistance consisting of the pooling of capital in a common basket fund using the SWAps, earmarked finance assistance where separate deliberations are carried out with the MOH and regarding funds are directly provided, and direct earmarked assistance for donor led projects.

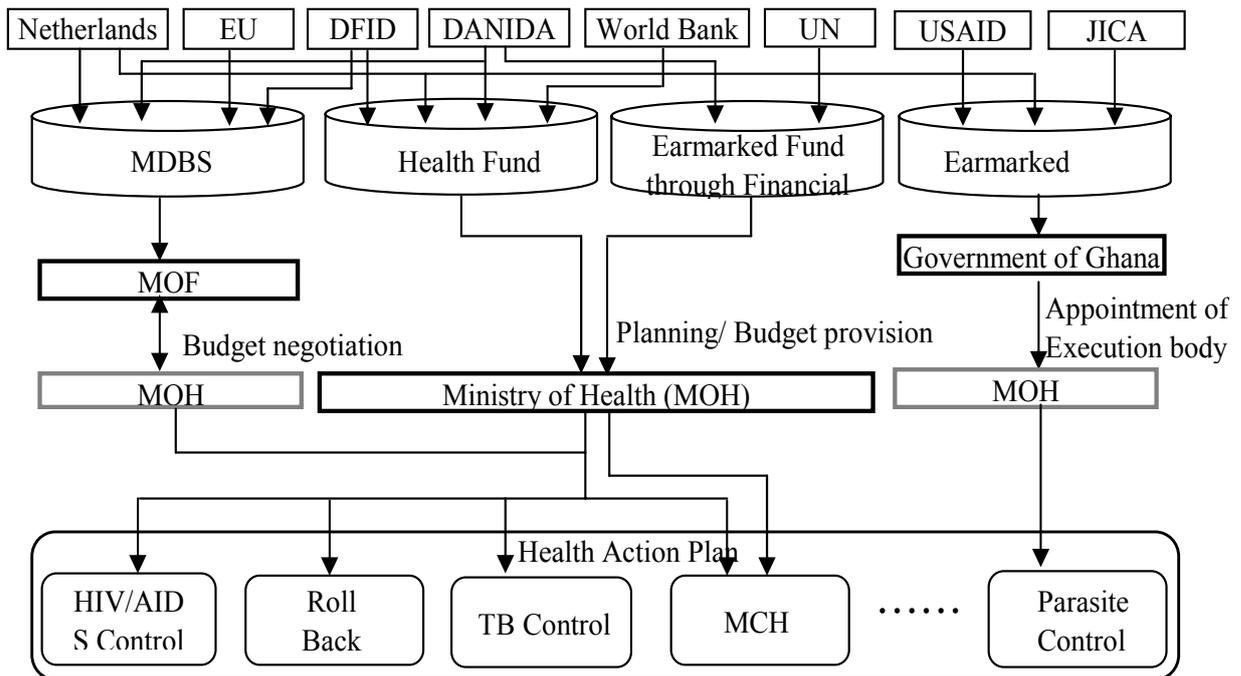
Ghana is one of the most successful examples of SWAps for the planning and implementation of health sector programs. The DFID, DANIDA, the World Bank, and various UN agencies have pooled their capital in a health fund and provided earmarked assistance. In the area of overall development assistance, Multi-Donor Budgetary Support (MDBS) is rapidly becoming a preferred means of provision. The EU and the Netherlands have shifted to the MDBS and by 2006 the DFID plans to completely shift over to MDBS.

In contrast to the health fund and earmarked financial assistance that can be used for the MOH's active operations to implement programs, MDBS must undergo budgetary negotiations between the Ministry of Finance and the MOH. Consequently, there is a possibility that the health sector may be affected in terms of the budget, since donors are transferring regular financial assistance to MDBS.

However, the GoG has left open the option of directly earmarked assistance by not limiting the assistance provided by assistance organizations to the health fund or earmarked financial assistance. Presently, JICA and the USAID are the only two donors that carry out directly earmarked assistance. Figure 4.3 shows the financial assistance schemes operated by the donor agencies.

According to the MOH and GHS, they have shown understanding towards JICA's directly earmarked assistance. JICA has not been participating in the SWAps, which has no significant influence on relations between JICA and other donors.

**Figure 4.3 Financial Assistance Schemes by Donor Agencies**



Prepared by the investigation team

## (2) Contents of Development Assistance

The MOH gives priority to infectious diseases control, and many donor agencies also assist in infectious diseases control, particularly the control of malaria and HIV/AIDS.

Many donor agencies such as DFID, WHO, UNAIDS, and USAID assist HIV/AIDS control programs. In addition to contributions to the health fund, DFID contributed 20 million pounds as bilateral assistance from 2003 to 2006, and assists VCT activities carried out by NGOs, the expansion of surveillance and HIV/AIDS care by WHO, and the activities of the GAC through USAID.

For malaria control, UNICEF, DFID and USAID assist in expanding the distribution activities of ITN, whereas WHO and the Dutch Embassy formulate pharmaceutical laws for anti-malaria drugs and promote appropriate medication.

Among UN organizations, WHO and UNICEF focus more on technical cooperation than financial assistance. UNAIDS coordinates HIV/AIDS control; and UNFPA assists in the prevention of mother-to-child transmission in the context of reproductive health. Table 4.5 below shows assistance programs by donor.

**Table 4.5 Major Donor Health Programmes (2003)**

Organization	MDBS	SWAps	Earmarked funds	Program
DFID	○	○	○	District health system Communicable diseases control (including EPI/NID) National AIDS control
Embassy of the Netherlands	○	○	○	National drug policy program Communicable diseases control (including EPI/NID) Research partnerships
DANIDA	○	○	○	District health system Communicable diseases control (including EPI/NID)
EU	○	(○)		HIMS National AIDS control
World Bank		○		Communicable diseases control (including EPI/NID) MCH program (PMTCT for HIV/AIDS)
WHO			○	Child health program, District health system Communicable diseases control (including EPI/NID) Revolving fund for guinea worm eradication
UNICEF			○	Communicable diseases control (including EPI/NID) Child health IDD Micro nutrients (Vitamin A) control PHC
UNFPA			○	MCH (PMTCT for HIV/AIDS) Child health
UNAIDS				National AIDS control program
USAID			○	Communicable diseases control (including EPI/NID) Child health National AIDS control program

Prepared by the investigation team

#### 4.2.4 Position and Roles of the NMIMR in Communicable Diseases Control

The NMIMR does not have an official role in infectious diseases control implemented by the MOH since the NMIMR is a semi-autonomous research institute of the University of Ghana. However, the NMIMR is recognized as a centre of excellence by the MOH. The MOH recognises the NMIMR as a semi-autonomous research institute that can independently and objectively assess the infectious diseases control programs of the MOH.

The position of the NMIMR in the main disease control programs is as follows. In addition, the NMIMR also provides technical advice to the MOH and GHS through the dispatch of staff members for the organisation of Rapid Response Teams for national preparedness in the event of a major disease outbreak

##### (1) Malaria

The NMIMR has conducted research on the drug resistance of malaria in collaboration with WHO/TDR, NIH, the Wellcome Trust, and the US Navy after the termination of JICA assistance to research on malaria in 1991. Based on the results of the research by the NMIMR, the GoG decided to replace chloroquine with other anti-malaria drugs. In addition, the director of the NMIMR, Dr. Ofori, is assigned as the chairperson of the National Malaria Control Programme.

## **(2) HIV/AIDS**

The NMIMR is Ghana's one and only laboratory that has the capacity and facilities to conduct CD4 counts and viral load tests among the official institutes in Ghana. The MOH recognizes the NMIMR as a reference laboratory and an EQA institute for HIV/AIDS. Under the NACP, the NMIMR conducts external quality assurance of HIV screening tests examined by provincial and district hospitals. In 2003, the NMIMR conducted demographic and health surveys (DHS) in collaboration with the Ghana Statistics Service and the Ghana Health Service (GHS). Furthermore, the NMIMR was in charge of external quality assurance for the HIV sentinel survey conducted by the NACP in 2003.

In addition, all HIV test kits imported into Ghana have to be evaluated by the NMIMR and NPHRL. Based on technical evaluations by both institutes, the GoG approves these imported kits.

## **(3) TB**

The MOH recognizes the NMIMR as a reference laboratory and EQA institute for TB. As of September 2004 when this field survey was conducted, the NTP explained that the NMIMR conducts most of the work of the national reference laboratory since the NPHRL, the other national reference laboratory for TB does not have a sufficient number of staff or adequate facilities.

## **(4) EPI**

The NMIMR is a regional reference laboratory for polio in West Africa. The NMIMR also conducts potency tests for EPI vaccines based on requests from the MOH.

As a research institute for infectious diseases, the NMIMR conducts various research activities including those related to the aforementioned diseases, such as HIV/AIDS and TB. The research areas of the NMIMR cover not only infectious diseases, but also other areas such as food security, antioxidants, and environmental pollution.

The NMIMR also has an important role as a training institute for infectious diseases control. Since the NMIMR belongs to the University of Ghana, all the senior staff members of the NMIMR have to allocate a maximum of 25% of their working time to teaching at the university. In addition, the NMIMR holds health training courses for medical technicians in Ghana, and also holds training courses on infectious diseases control nationally and regionally.

The NMIMR also trains undergraduate and post-graduate students from other universities in Ghana and in foreign countries. The NMIMR has two types of training courses, one is a short-term course for vacation students, called attachment students, and the other is a long-term course for Masters and PhD students, called project students. The NMIMR has accepted new students every year (see Table 4.6).

**Table 4.6 Number of Students Newly Accepted at the NMIMR**

	2000	2001	2002	2003	2004
Attachment	3	1	13	20	24
Project	28	8	3	10	15

Prepared by the investigation team

As mentioned above, the MOH recognizes the NMIMR as a reference laboratory and EQA institute for HIV/AIDS and TB. As a member of health programs/committees of the MOH, the NMIMR also provides technical advice to the MOH.

The roles of the NMIMR in infectious diseases control are summarized in Table 4.7.

**Table 4.7 Main Roles of the NMIMR on Infectious Diseases Control**

Main Role	Activities
Research	Principal research areas : Malaria, Schistosomiasis, Onchocerciasis, Filariasis, Diarrhoeal diseases, Buruli ulcer, TB, HIV/AIDS, STD, Food security micronutrients, Parasite immunology, Viral haemorrhagic fevers, EPI diseases, Sickle-cell diseases, Plant medicines, Antioxidants, Environmental pollution.
Human Resources Development	Medical research training for undergraduate and post-graduate students, and medical and diagnostic training for technicians.
Contribution to Health Services	Information services as a reference laboratory, QA for TB and HIV testing, Dispatch of staff to the national response systems for emerging and re-emerging infectious diseases, Technical advice on health programs and committees

Prepared by the investigation team

As mentioned in Table 4.8, 11 research areas out of the 18 mentioned above relate to infectious diseases, and JICA cooperates in research on 9 diseases out of these 11.

**Table 4.8 Target Diseases of JICA Projects**

Target Diseases of JICA Projects	Non-Target Diseases
EPI diseases	Onchocerciasis
HIV/AIDS	Buruli ulcer
STD	Sickle-cell diseases
TB	Food security
Schistosomiasis	micronutrients
Diarrhoeal diseases	Parasite immunology
Filariasis	Plant medicines
Malaria	Antioxidants
Viral haemorrhagic fevers	Environmental pollution

Prepared by the investigation team

#### 4.2.5 Relationship of the NMIMR to Other Organizations Involved in Communicable Diseases Control

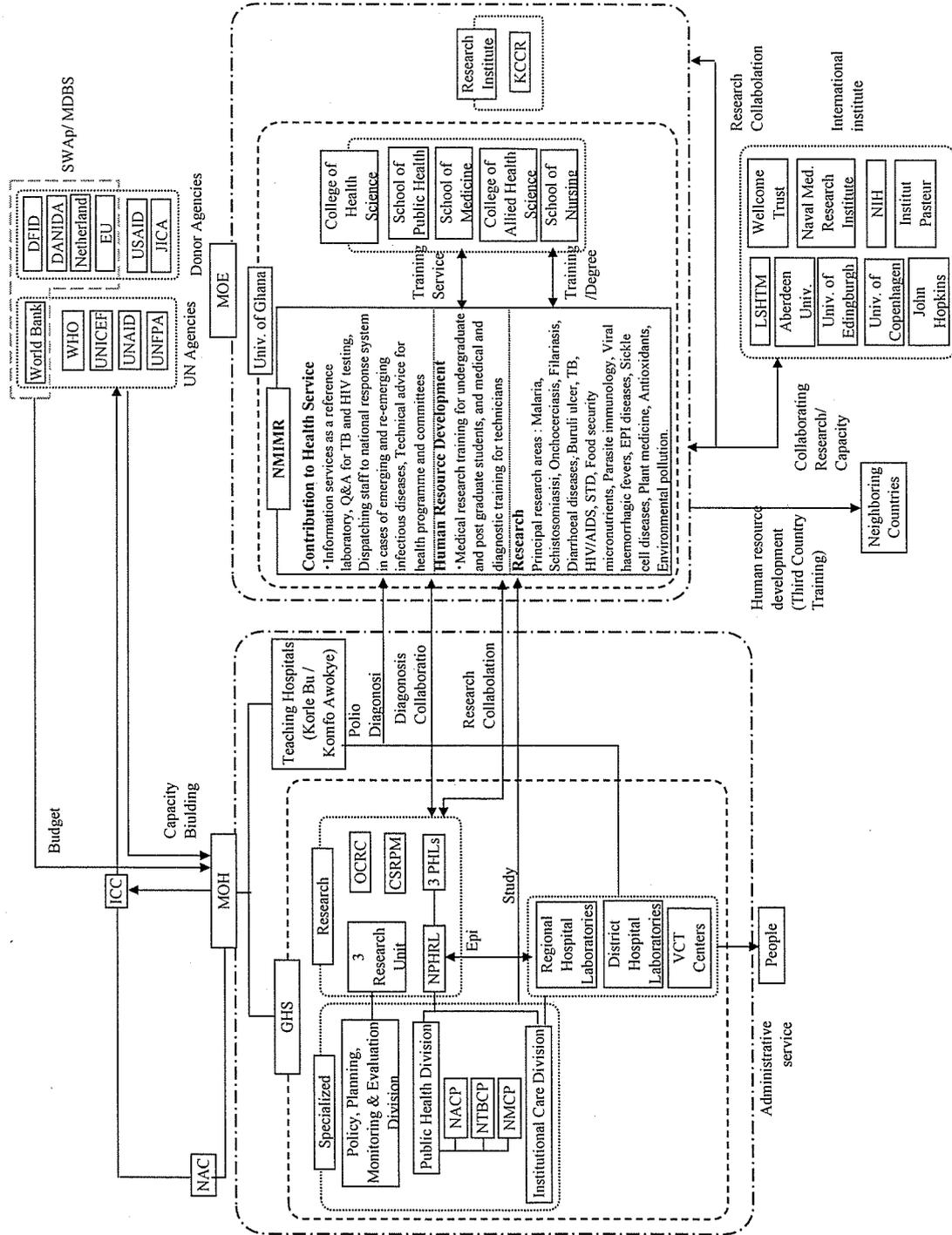
In Ghana, the GHS mainly conducts infectious diseases control. Their research unit collects data for the research and studies needed for infectious diseases control. The NMIMR helps by submitting data upon request. Using this data, each unit prepares countermeasures and disseminates them to hospitals and health facilities. When an

infectious disease occurs in a rural region, the NPHRL will test the specimens sent from the rural hospitals. If a diagnosis is difficult to obtain through the NPHRL, the NMIMR will be requested to identify and diagnose the specimen. The epidemiological data thus obtained is disseminated to the MOH and WHO.

Aside from this system, the NMIMR is also involved in developing personnel through collaborative research with overseas research institutes as well as educational instruction in the medical institutions of the university.

The relationship between the NMIMR and other organizations involved in infectious diseases control in Ghana is shown in Figure 4.4.

**Figure 4.4 Relationship of the NMIMR to Other Organizations related to Infectious Diseases Control**



**Fig. 4.4 Relation of NMIMR and Other Organizations for Infectious Disease Control**

#### **4.3 NMIMR's Contribution to Communicable Diseases Control Based on the Cooperation Provided by JICA**

The NMIMR has largely developed its research infrastructure and research capacity in cooperation with JICA. Collaboration on research with foreign institutes has been promoted simultaneously with the capacity development of the NMIMR. The NMIMR is now ranked as one of the top research institutes in Africa.

The NMIMR has contributed to improving infectious diseases control in Ghana through the dissemination of research outputs among the medical personnel or by having research outputs reflected in the health services of the GoG. In particular, the NMIMR has contributed substantially to improving the control of vaccine preventable diseases and TB.

The research outputs that contributed to human resources development or health services are summarized below according to the diseases.

##### **4.3.1 Contribution According to Each Disease**

###### **(1) Vaccines/Vaccine Preventable Diseases**

Techniques for EPI diseases diagnosis and vaccine potency tests were transferred to the NMIMR from the initial stage of JICA's cooperation. Then the NMIMR started its research activities using the transferred techniques in collaboration with WHO from 1986.

The NMIMR contributed to improving the health services through the evaluation of cold chains for EIP vaccine transportation and also as a regional reference laboratory using techniques that the NMIMR acquired from JICA projects. In addition, the NMIMR also contributed to improving the EPI techniques in neighbouring countries as a training institute.

###### **1) Potency Testing of EPI Vaccines**

In Ghana, EPI vaccines were transported inappropriately in the late 1980s due to the undeveloped cold chain system.

To support WHO's polio eradication program, the NMIMR monitored the distribution process of imported EPI vaccines and conducted potency tests on the vaccines. The results showed that imported vaccines had deteriorated; the vaccine potency was lower than the WHO standard. WHO has recognised the inappropriate transportation conditions for EPI vaccines. Subsequently, WHO established a tracing system for quality control of the transported vaccines.

The NMIMR contributes to the effective implementation of EPI through the quality control of EPI vaccines by conducting monitoring and potency testing of the EPI vaccines. The NMIMR still conducts potency testing of EPI vaccines based on requests from the MOH.

## 2) Polio Surveillance

All suspected polio cases collected in Ghana are sent to and tested by the NMIMR. Based on the results of diagnosis, the NMIMR provides technical advice to the GHS. In 2003, the NMIMR has recognized an increase in the number of polio cases among suspected cases sent from the districts, thus the NMIMR conducted polio and other enterovirus surveillance and isolated poliomyelitis from 15 stool samples. Based on this result, the NMIMR advised the GHS of the immediate need for immunization as a response to a polio outbreak, and in 2003 the GHS implemented the National Immunization Campaign for polio in 2003. The GHS plans to implement the same campaign again in October 2004. The NMIMR contributed to the accurate implementation of infectious diseases control through the technical advice given to the GHS based on their study results.

## 3) Technical Extension using Third-Country Training Programmes

The NMIMR has held two forms of technical training sessions, namely, on Vaccine Potency Testing and Polio-related Diagnosis Procedures and the Laboratory Diagnosis of Yellow Fever and Polio infection as Third-Country Training Programmes (TCTP). There have been 71 participants from 12 countries and 32 participants from 10 countries trained in the Vaccine Potency Testing and Polio-related Diagnosis Procedures and Laboratory Diagnosis of Yellow Fever and Polio infection training, respectively (see Table 4.9).

**Table 4.9 Number of TCTP Participants in PVD**

Unit: Person

	Vaccine Potency Testing and Polio Diagnosis Procedures							Laboratory Diagnosis of Yellow Fever and Other EPI Viral Diseases			
	1991	1992	1993	1994	1995	1996	Sub-total	1997	1998	1999	Sub-total
Cameroon	1	0	0	0	1	0	2	1	1	0	2
D. C. Congo	0	0	1	1	0	0	2	0	0	0	0
Ethiopia	1	1	0	0	0	1	3	0	1	2	3
Gambia	1	0	1	0	0	0	2	2	0	0	2
Ghana	3	2	2	2	1	2	12	2	1	2	5
Kenya	1	1	1	1	2	2	8	1	1	1	3
Nigeria	1	3	3	3	1	2	13	2	2	3	7
South Africa	0	0	0	0	2	1	3	0	0	0	0
Tanzania	0	1	1	1	2	0	5	0	1	1	2
Uganda	1	1	1	1	1	2	7	1	2	2	5
Zambia	0	2	1	1	1	1	6	0	1	1	2
Zimbabwe	2	1	1	2	1	1	8	1	0	0	1
<b>Total</b>	<b>11</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>71</b>	<b>10</b>	<b>10</b>	<b>12</b>	<b>32</b>

Note: The training course in 1991 was held by WHO without JICA assistance.

Prepared by the investigation team based on the data provided by the NMIMR

The TCTP on “Vaccine Potency Testing and Polio-related Diagnosis Procedures” and “Laboratory Diagnosis of Yellow Fever and Polio infection” were held in collaboration with WHO. According to a WHO evaluation study on training in 1995, the majority of the opinions of the participants was that the main objectives of the courses were met, and the curriculum level was appropriate. This study also reported

that participants from five countries out of the nine utilised the trained techniques in their countries.

The NMIMR contributed to improving the laboratory diagnosis of polio in neighbouring countries by implementing the TCTP. WHO also sees this training as being successful and it established a new training course for French-speaking countries in central Africa.

The NMIMR also held a training course on laboratory diagnosis procedures for polio in 2000, after the termination of JICA's assistance to the TCTP on EPI in 1999. In this training, there were 12 participants from the WHO EPI African Laboratory Network, excluding Ghana. For this training, JICA only assisted in providing equipment.

As a training institute, the NMIMR continuously contributes to technical improvement in the neighbouring countries after the termination of JICA's assistance to TCTP on EPI.

## (2) HIV/AIDS

Control of HIV/AIDS is one of the priority tasks in the Ghana health sector, though the prevalence rate of HIV/AIDS in Ghana is relatively low at 3.6% in 2003 compared to other African countries. The National HIV/AIDS control plan in cooperation with Family Health International (NGO) has just started a pilot project since 2003.

The NMIMR has contributed to the control of HIV/AIDS by improving testing techniques, providing new technology and technical evaluation of imported test kits; although the impact is barely visible and not yet reflected in the health services.

### 1) Improving HIV Testing Techniques

Under the NACP, the NMIMR conducts external quality assurance for the HIV screening tests examined by provincial and district hospitals. In 2003, the NMIMR conducted a demographic and health survey (DHS) in collaboration with the Ghana Statistics Service and the Ghana Health Service (GHS). Furthermore, the NMIMR was in charge of the external quality assurance for the HIV sentinel survey conducted by the NACP in 2003.

As a part of the ICTP, national and regional workshops on Quality Control/Assurance (QCA) in HIV testing were also held by the NMIMR in collaboration with the MOH and GHS (see Table 3.10).

**Table 4.10 Number of Trainees of the ICTP for HIV/AIDS**

Title	Period	No. of participants
National Stakeholders workshop on Quality Control/Assurance (QCA) in HIV testing	Feb. 2001	72 from 39 institutions of the 10 regions.
Regional Level workshops on QCA in HIV testing	2001, 2002	74 laboratory technicians

Prepared by the investigation team

In addition, the NMIMR confirmed that the knowledge acquired from the workshops was well utilized by the participants through a follow-up survey on all 74 participating district laboratories. These participants were assigned as technicians of the HIV/AIDS sentinel survey and other surveillance programs.

Through these activities, the NMIMR contributes to improving the capabilities of diagnostic institutes and also provides accurate HIV testing for other nations.

## **2) Providing New Technology**

The NMIMR is Ghana's only laboratory that has the capacity and facilities for conducting CD4 counts and viral load analysis among the official institutes in Ghana. The NMIMR also conducts molecular level and genetic analysis that the NPHRL is not capable of. In addition, the NMIMR provides diagnostic services (CD4 counts and viral load analysis) for the ART pilot project mentioned above.

The NMIMR contributes to improving HIV control programs by providing such new technologies for HIV diagnosis. These new technologies, such as CD4 counts and viral load analysis will be fully utilised by the GoG when the ART is being promoted in the future.

## **3) Technical Evaluation for Imported Test Kits**

All HIV test kits and anti-snake venom serum test kits imported into Ghana have to be evaluated by the NMIMR and NPHRL. Based on the technical evaluation by both these institutes, the GoG approves these imported kits.

This technical evaluation by the NMIMR enables the GoG to introduce adequate diagnostic kits in accordance with the HIV strain in Ghana.

## **(3) Tuberculosis**

As mentioned above, the MOH and DANIDA review of the NTP in 1998 found that the TB Microscopy services was the weakest component of the DOTS Control Strategy in Ghana. Regular supporting/monitoring visits to the laboratories at all levels were not carried out, there was no National TB Laboratory Manual and Quality Assurance of the TB Microscopy Services was not in existence.

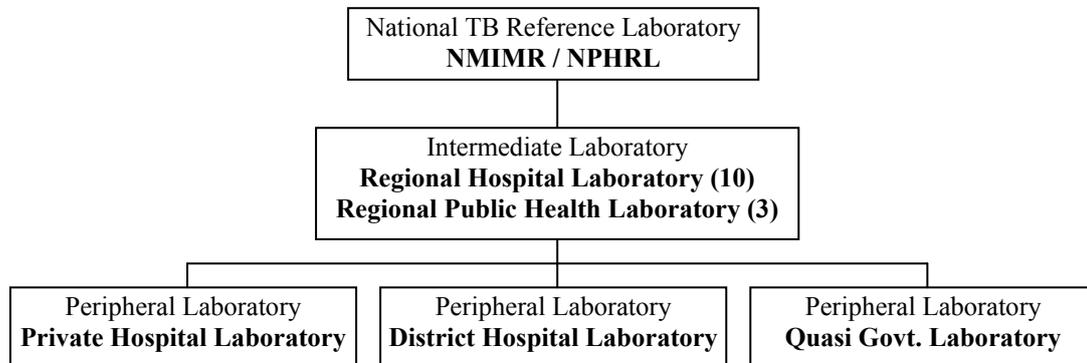
The NMIMR introduced an EQA system into the TB Microscopy centres and prepared a manual for resolving these problems. As a result, significant improvements were recognized in the review by WHO in 2002. The NMIMR contributed to improving TB control by improving the diagnostic accuracy of TB Microscopy services.

According to the NTP, most of the work for QA is carried out by the NMIMR due to the fact that the NPHRL does not have sufficient human resources and facilities for the TB sector.

### **1) Introducing EQA for TB Testing to the Public TB Microscopy Centres**

The NTP established a quality assurance system in TB microscopy in cooperation with JICA. The framework of the QA system is shown on Figure 4.5.

**Figure 4.5 QA Framework for TB Microscopy Diagnosis in Ghana**



Source: National Tuberculosis Control Programme (2001), Tuberculosis Microscopy: a Laboratory Manual for Ghana

Intermediate laboratories periodically collect slides from peripheral laboratories for evaluation, then feed back the results to the peripheral laboratories. The NMIMR dispatches staff to the intermediate laboratories once a year for QA in both the intermediate and peripheral laboratories. Regarding the private sector, microscopy centres in Accra and Kumasi were covered by the QA system, and the NMIMR and the NTP plans to expand this to nationwide coverage.

The NMIMR is responsible for following items as a national reference laboratory on TB.

- All the functions of an intermediate laboratory.
- Updating and distribution of protocols for TB microscopy.
- Development and distribution of guidelines on TB supporting visits and QA.
- Collaboration with the NTP in making technical recommendations for the purchase of equipment, reagents and other laboratory supplies.
- Training of regional laboratory staff in smear techniques, QA, biosafety measures and the maintenance of equipment.

As shown on Table 4.11, the NMIMR held two training courses, namely, training on TB microscopy and training on quality assurance in TB microscopy, to introduce the EQA system into public microscopy centers.

**Table 4.11 Number of Trainees in ICTP on TB Control**

Title	Period	No. of participants
Middle-level manpower-training program on TB microscopy	10-14 Sept. 2001	14 Laboratory personnel and regional TB coordinators from Upper-West, Upper-East, Northern Centers, including 1 from a private laboratory in the Greater Accra Region.
Middle-level manpower-training program on TB microscopy	24-28 Sept. 2001	11 Laboratory personnel and regional TB coordinators from the Brong-Ahafo and Ashanti regions and 1 from a private laboratory in the Greater Accra Region.
Middle-level manpower-training program on TB microscopy	21-25 Jan. 2002	14 Laboratory personnel and regional TB coordinators from the Volta, Western, and Central regions
Middle-level manpower-training program on TB microscopy	18-22 Feb. 2002	16 Laboratory personnel and regional TB coordinators from the Eastern, Greater Accra, and Ashanti regions
Middle-level manpower-training program on quality assurance in TB microscopy	6-15 Jan. 2003	13 Laboratory personnel and regional TB coordinators from the Eastern, Greater Accra, Upper-East and Upper-West regions
Middle-level manpower-training program on quality assurance in TB microscopy	1-10 Feb. 2003	13 Laboratory personnel and regional TB coordinators from Volta, Western and Brong-Ahafo regions and four staff of the bacteriology unit of NMIMR
Middle-level manpower-training program on quality assurance in TB microscopy	7-16 April 2003	13 Laboratory personnel and regional TB coordinators from the Ashanti, Northern and Central regions and three new staff of the bacteriology unit of the NMIMR and a new private sector coordinator of the NTP.

Source: NMIMR (2003), National Training Course Tuberculosis Microscopy Final report

The specific objectives of the training on TB microscopy were to strengthen the skills for sputum smear examinations at various levels of laboratory personnel in the country, to impart the necessary techniques in biosafety in TB microscopy and to introduce a system of quality assurance (QA) in order to strengthen the microscopy network in the country. This training was conducted as a part of the MOH in-service training.

The specific objectives of the training on quality assurance in TB microscopy were to introduce the concept of QA into TB microscopy centres in the country, to impart the necessary techniques to laboratory personnel and regional TB coordinators in order to strengthen regional capacity

Both training courses targeted technicians and TB coordinators at the regional level, and trained 94 persons between 2001 and 2004. These regional technicians held training courses for district technicians with the assistance of the NMIMR. About 250 district technicians were trained by the regional technicians who had been trained by the NMIMR.

Thus, the NMIMR has contributed to improving the capabilities of the TB microscopy centers and also provided accurate TB diagnosis for other nations by introducing EQA into public microscopy centers.

## 2) Introducing the EQA system into Private Hospitals

The EQA system mentioned above was introduced into public microscopy centers as a part of the Infectious Diseases Project.

However, the National Tuberculosis Programme (NTP) estimated that close to 50% of all TB patients visit private clinics/hospitals and laboratories before finally being diagnosed in the public sector facilities. Many suspected TB cases and actual patients prefer to seek health care at private health facilities, among other reasons for the assurance of privacy and the avoidance of stigmatisation, especially as TB is increasingly being associated with HIV/AIDS. However, the management of TB in the private sector lags behind that of the public sector, hence the need to strengthen this sector.

Based on the experience of the Middle-Level Manpower Training sessions, the NMIMR and the NTP with the support of the Global Fund against Tuberculosis, AIDS and Malaria initiated a training program for private laboratory personnel from Accra and Kumasi (see Table 4.12).

The specific objectives of the course were:

- To strengthen the skills of private laboratory personnel in sputum smear microscopy.
- To impart the necessary biosafety techniques in TB Microscopy.
- To introduce a TB Microscopy Quality Assurance System.

**Table 4.12 Number of Private Laboratory Personnel Trained**

Training period	No. of trainees	
20-25 Oct. 2003	20	Accra
27 Oct. - 1 Nov. 2003	16	Accra
10-15 Nov. 2003	22	Accra
13-18 Oct. 2003	17*	Kumasi
<b>Total</b>	<b>75</b>	

Note: \*Including 2 trainees from the NTP and Regional TB coordinator.

Source: Training course on TB Microscopy and QA for Private Laboratory Personnel from the Accra Metropolis, Training course on TB Microscopy and QA for Private Laboratory Personnel from the Kumasi Metropolis

In addition, follow-up visits were paid to participants by the NMIMR in March and April 2004. Staff members of the NMIMR conducted a slide evaluation for blinded rechecking as a part of QA during the period of these follow-up visits.

The TB microscopy centres in private hospitals in Accra and Kumasi are able to provide accurate diagnosis for other nations through the contribution of the NMIMR.

#### (4) Improvement of Public Health in the Communities

The NMIMR conducted a series of activities to improve primary health care such as health education, vaccination sessions, treatment of childhood diseases, etc. in communities in the Gomoa district from 1986 to 1991. It was reported that significant changes were observed in the increase in the vaccination rate among children, a reduction in malaria mortality, and a lower maternal death rate in these communities.

The health facilities established by the JICA project have also been well managed through cooperation between the district government and the communities. In addition, the NMIMR reported that the communities recently constructed accommodations for doctors and nurses. The NMIMR contributed to improving the health condition and knowledge of community residents through these activities.

#### (5) JICA's Cooperation with the NMIMR

As mentioned above, JICA has supported various kinds of research activities on infectious diseases. The research capacity of the NMIMR established through technical cooperation with JICA has been utilized for the implementation of surveillance and reference services. Diagnostic techniques training by JICA has been disseminated to medical personnel inside and outside the country.

As mentioned in section 4.2.4, 11 research areas out of 18 are related to infectious diseases, and JICA has cooperated in research activities on 9 diseases of the 11. It was confirmed that the NMIMR has conducted activities in human resources development and the improvement of health services for 4 diseases out of the 9 (see Table 4.13).

**Table 4.13 JICA's Cooperation with the NMIMR**

Target diseases	Research	Human Resources Development	Contribution to the Health Services		
			Surveillance	Reference	Direct Contribution to the Population
EPI diseases	○	○	○	○	—
HIV/AIDS	○	○	—	○	—
STD	○	—	—	—	—
TB	○	○	—	○	—
Schistosomiasis	○	—	○	—	○
Diarrhoeal diseases	○	—	—	—	—
Filariasis	○	—	—	—	—
Malaria	○	—	—	—	—
Viral haemorrhagic fevers	○	—	—	—	—

Prepared by the investigation team

#### 4.3.2 Achievements of JICA's Cooperation

As mentioned in section 4.3.1, the NMIMR has contributed to infectious diseases control in cooperation with JICA. JICA contributed not only to diseases control, but

also to the capacity development of the NMIMR. The achievements of JICA's cooperation in capacity development with the NMIMR are as follows.

### (1) Capacity Development of the NMIMR

As mentioned in section 4.1.3, it was expected that technical cooperation provided by JICA since 1968 aimed to strengthen the research capacity of the NMIMR and also strengthen the capacity of medical personnel engaged in infectious diseases control through training.

The NMIMR has implemented collaborative research with foreign institutes such as WHO/TDR, DANIDA, and NIH after establishing its research capacity through technical cooperation with JICA. Case examples of this collaborative research by the NMIMR that were confirmed in this study are shown on Table 4.14.

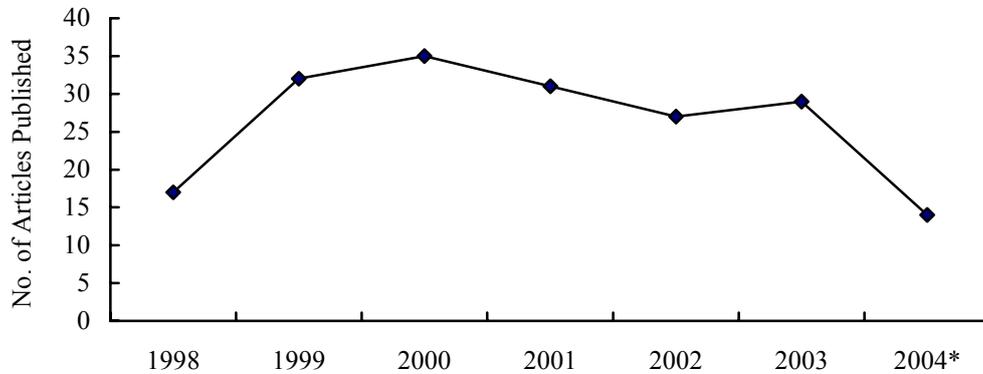
**Table 4.14 Case Examples of Collaborative Research by the NMIMR**

Overseas Research Institutes	Research Content
USAID and EU	Monitoring and operational research for HIV/AIDS
Aberdeen University (Scotland)	PMTCT in IMMPACT (Initiative for Maternal Mortality Programme Assessment)
Centre for Medical Parasitology, University of Copenhagen	Parasitology research (malaria and filariasis)
International Atomic Energy Agency (IAEA)	Research on food contamination (Nutrition Unit)
Institute for Stem Cell Research, University of Edinburgh (Scotland)	Research on animal experiments
NIH (USA)	Research on sickle-cell anaemia (Epidemiology Unit)
Institut Pasteur (France)	Malaria research
London School of Hygiene and Tropical Medicine (England)	Malaria research (Epidemiology Unit)
Naval Medical Research Institute	Malaria research (Clinical Pathology and Haematology Unit)

Source: NMIMR (1997 – 2003), Annual Report

These research outputs have been regularly reported through Annual Research Meetings and also published in internal/external journals (see Figure 4.6).

**Figure 4.6 Number of Publications by NMIMR (1998~2004)**



Note: Number of publications as of July 2004.  
Source: NMIMR (1997- 2003), Annual Report

The NMIMR has regularly published a certain number of articles, although the number has fluctuated. It seems from this that the NMIMR has continuously conducted sophisticated research.

Besides these research activities, the NMIMR has been designated as a National Reference Laboratory for HIV/AIDS since 1989. In addition, the NMIMR has also been designated as a Regional Reference Laboratory for Polio diagnostics since 1992 by WHO. Thus, the diagnostic capacity of the NMIMR has been recognized by WHO.

Regarding the technical development of staff members, all units of the NMIMR have a staff development plan to improve the educational background and working experience of the staff members. The staff of the NMIMR are able to take training courses for PhD and Masters' degrees using scholarships. There were 37 staff members in training or who were trained in the period 1999 to 2003 (see Table 4.15).

**Table 4.15 Number of Staff in Training or who were Trained during the Period 1999 to 2003 (full-time and project related)**

Unit: person

	PhD		Mphil, MPH, MSc		Total
	Completed	In Progress	Completed	In Progress	
Bacteriology	-	2	1	1	4
Clinical Pathology	-	1	1	2	4
Electron Microscopy	-	1	-	1	2
Epidemiology	-	1	3	-	4
Immunology	1	1	-	3	5
Laboratory Animals	-	1	1	1	3
Nutrition	1	1	-	1	3
Parasitology	-	2	-	5	7
Virology	-	2	2	1	5
<b>Total</b>	<b>2</b>	<b>12</b>	<b>8</b>	<b>15</b>	<b>37</b>

Source: NMIMR (1997- 2003), Annual Report

The staff members of the NMIMR strive to improve their own capacity by participating in these training sessions.

It seems that the NMIMR has developed a sophisticated research capacity since it has regularly published research articles and has been designated as a National and Regional Reference Laboratory. In addition, the NMIMR maintains the appropriate technical level of its staff through the implementation of staff development plans.

## **(2) Infrastructure Development**

Japan contributed to the improvement of the capacity of the NMIMR in various aspects of technology transfer and also infrastructure development. The buildings of the NMIMR and a large quantity of equipment were procured through Japanese assistance. The NMIMR highly values this advanced infrastructure and the technology transferred by JICA, which has enabled them to implement collaborative research activities with foreign institutes. These collaborative research activities with other foreign institutes have also improved the research capacity of the NMIMR.

Japanese cooperation, which combines technical cooperation with development assistance for the research infrastructure, has resulted in a major effort to ensure successful results for the NMIMR.

## **(3) Strengthening the Capacity for Research Implementation**

As mentioned above, the NMIMR has acquired the capacity to conduct research that enables it to be an equal partner in collaborative research with foreign institutes through the technical transfer and infrastructure development supported by Japan. This capacity has also enabled the NMIMR to continuously obtain research grants from foreign institutes as well as to strengthen the financial base of the NMIMR.

The financial resources of the NMIMR consist of the budget allocations from the GoG, research grant from foreign institutes, and earnings from income-generating activities. The NMIMR relies for its development expenditures on grants from foreign donors.

The budget allocation from The GoG covers recurrent expenditures such as personnel costs, administrative costs, and investment (repair) costs. The GoG also allocates services cost when the GoG requests the NMIMR to provide a laboratory service. Personnel costs accounted for 80 to 90% of the total budget allocation from the GoG during the period between 1997 and 2003. Due to inflation, personnel costs increased by about 30% per year, thus the budget allocation from the GoG increased from 775 million Cedis in 1997 to 4,506 Cedis in 2003.(see Table 4.16).

**Table 4.16 Budget from the Government of Ghana**

	Unit: 1,000 Cedis						
	1997	1998	1999	2000	2001	2002	2003
Personnel	649,750	879,877	1,226,055	1,860,264	2,302,027	2,922,949	3,973,041
Administration	124,990	98,271	147,335	154,100	142,614	146,578	69,466
Services	0	0	40,583	0	0	181,261	345,341
Investment	0	0	0	0	0	28,422	118,580
<b>Total</b>	<b>774,740</b>	<b>978,148</b>	<b>1,413,973</b>	<b>2,014,364</b>	<b>2,444,641</b>	<b>3,279,210</b>	<b>4,506,428</b>

Note: Electricity and water charges are paid by the Government directly.

1 US Dollar = 8,754 Ghanaian Cedi (as of January 2003)

Prepared by the investigation team based on the data provided by the NMIMR

As a leading institute in Africa, the NMIMR, which has a sophisticated technology and infrastructure, conducts many collaborative research projects with foreign research institutes. Case examples of collaborative research carried out by the NMIMR and foreign research institute are shown in Table 4.14.

The amount of the research grants has also increased constantly since 1997, although there was no increment in grants from JICA. Due to the increment in grants from other donors, the proportion of JICA assistance towards research grants decreased rapidly from 50% in 2000 to 15% in 2003 (see Table 4.17).

**Table 4.17 Composition of Research Grants**

	Units: US\$							
	1996	1997	1998	1999	2000	2001	2002	2003
Others	381,006	401,823	440,262	552,843	321,515	957,304	1,309,270	1,887,895
JICA				379,100	435,000	499,000	337,429	337,243
<b>Total</b>	<b>381,006</b>	<b>401,823</b>	<b>440,262</b>	<b>931,943</b>	<b>756,515</b>	<b>1,456,304</b>	<b>1,646,699</b>	<b>2,225,138</b>

Prepared by the investigation team based on the data provided by the NMIMR

The NMIMR also generates income based on limited clinical laboratory services to the public and laboratory programs of other institutions and organizations such as the MOH, UNICEF and private companies, although the amount of income from these activities could not be confirmed during the evaluation study period.

It is considered that the financial sustainability of the NMIMR is very high due to its regular collaborative research with foreign institutes and stable financial support from the GoG.

On the other hand, the appropriateness of the technical cooperation system of JICA aimed at technical transfer should be considered along with strengthening the sustainability of the NMIMR.

The heads of the units interviewed also enumerated the following shortcomings of JICA's technical cooperation system in comparison with collaborative research with other foreign institutes.

- The research budget for JICA's technical cooperation was managed only by the Japanese side, and not open to the Ghanaian side. Hence, it has prevented the development of Ghanaian ownership in terms of the planning of the research.
- Generally, researchers in the NMIMR gain an additional allowance for taking part in collaborative research funded by other institutes. However, project-type technical cooperation through JICA has no similar system of payment to C/Ps. Therefore, researchers in the NMIMR have low motivation to participate in JICA projects due to lack of this allowance system,.

The above shortcomings were frequently pointed out by the Ghanaian side when the evaluation study was being conducted for each project. JICA has worked to improve this shortcoming.

#### **(4) Strengthening the Relationship with the MOH**

The NMIMR is an affiliated research institute of the University of Ghana, and belongs to the Ministry of Education (MOE). Therefore, it was pointed out that it was difficult for the research outputs of NMIMR to be reflected in the infectious diseases control programs of the MOH. However, the NMIMR has held annual research meetings that seek to bridge the "Research – Policy Divide" since 2001. These meetings bring together policy makers from the MOH, Directors and Programme Managers of the GHS, academics and other health partners to discuss research findings and identify the research needs of public health programs, with the aim of integrating relevant research findings into policy and implementation programs.

Due to these meetings, communication between the NMIMR and the MOH has improved, and it became easier to reflect research outputs of the NMIMR in the infectious diseases control programs of the MOH.

It was also pointed out that JICA's cooperation focused on research activities and only in a few cases included activities to enable the research outputs to be reflected in the health services. Such cases were mostly in initial stages of the cooperation period. It seems that the projects at the initial stage of JICA's cooperation aimed at the capacity development of the NMIMR, and could not afford to develop a collaborative structure with related organizations.

The MOH explained to the evaluation team that the NMIMR is recognized as a centre of excellence by the MOH. The MOH also appoints staff of the NMIMR as members of its health programs and committees and receives technical advice from them (see Table 4.18).

**Table 4.18 List of Committees / Programs that the NMIMR is Appointed to as a Member**

Name of Committee / Program	Unit	Name of Committee / Program	Unit
National Malaria Control Programme	Director General	National BCT Guidelines Committee	Virology
National Polio Expert Committee	Virology	National Task Force on Lymphatic Filariasis	Parasitology
National PMTCT Taskforce	Virology	WHO Scientific and Technical Committee on the Insect Vectors of Diseases	Parasitology
National Vaccine Advisory Committee	Virology	National Task Force on Leishmaniasis	Parasitology
National Technical Committee on ARV	Virology	National Malaria Technical Committee	Parasitology
National HIV Testing and Evaluation Guidelines Committee	Virology	National Task Force on Trypanosomiasis	Parasitology
National HIV Quality Assurance Guidelines Committee	Virology	National TB Advisory Committee	Bacteriology
National Opportunistic Infections Guidelines Committee	Virology	National Buruli Ulcer Advisory Committee	Bacteriology

Prepared by the investigation team

During the initial stage of JICA's cooperation, research outputs were not readily reflected in the infectious diseases control programs due to the lack of clarity concerning the role of the NMIMR in infectious diseases control and the lack of a system of cooperation with related organizations. However, this situation was improved by having annual meeting and with the participation of the NMIMR in the health programs and committees of the MOH. Furthermore, JICA's technical cooperation projects have made a point of developing a relationship with the MOH since the "Infections Diseases Project of the Noguchi Memorial Institute for Medical Research (1999-2003)", and it has increased research activities that have directly contributed to improving the health services, such as by introducing QA for HIV/AIDS and TB, and de-worming through school health activities. These changes have contributed to the reflection of research outputs in infectious diseases control.

### 4.3.3 Conclusions

JICA has implemented cooperation with the expectation that the health services would be improved through the effect of the NMIMR functioning as a base for research and diagnosis on infectious diseases control, as well as a base for the human resources development. As mentioned above, the NMIMR has contributed extensively to infectious diseases control in Ghana and the African region as a research institute and reference laboratory. In addition, the NMIMR has also contributed to infectious diseases control as an education and training institute. The dissemination of research outputs among medical personnel in the country as well as third-country training has improved health services in general.

In general, the role of a research institute is to develop the technology for infectious diseases control. A series of JICA cooperation activities has enabled research to be conducted that has improved health services, such as through the distribution system of vaccines and improvements in the accuracy of diagnosis. It is therefore considered that these activities have contributed to improving the health of the population indirectly through the improvement of health services.

However, a dichotomy between the needs of the NMIMR and objective of technical cooperation with JICA that aims at technology transfer has accompanied the enhancement of the independence of the NMIMR through the strengthening of its collaborative research with foreign institutes, although JICA's technical cooperation met the needs of the NMIMR in the initial stage of cooperation. It is concluded that a new cooperation scheme that involves the NMIMR as an equal partner is required to improve future cooperation.

#### **4.4 Expected Roles of the NMIMR**

The NMIMR has contributed to improving infectious diseases control in Ghana based on assistance from JICA. The expected roles of the NMIMR in relation to its further contributions to infectious diseases control are summarized from the viewpoint of research, human resources development and contributions to the health services as follows:

##### **(1) Research**

Japan has assisted the NMIMR through technology transfer based on project-type technical cooperation and infrastructure development through grant aid since the NMIMR was established. The NMIMR introduced advanced technology to improve infectious diseases control, such as molecular level and genetic analysis through technical cooperation with JICA. Even now, the NMIMR is the only institute that is able to conduct CD4 counts and viral load analysis among all the government institutes.

The research subjects of the NMIMR have covered a broad spectrum from medical issues in Ghana to regional issues such as EPI. These research outputs have been well applied in the implementation of infectious diseases control by the MOH and other research partners. In addition, the research outputs have also been utilized through their publication in international journals, and are utilized widely to improve infectious diseases control.

Research on infectious diseases control is not only the mandate of the NMIMR, but also a means to secure research grants from foreign institutes. In addition, experience in collaborative research with foreign institutes also improves the research capacity of the NMIMR.

The NMIMR has become established as the foremost medical research institute in Ghana. It is expected that the NMIMR will continue to conduct cutting-edge research activities in order to help improve infectious diseases control in Ghana and neighbouring African countries. It is recommended that this research be strengthened with regard to major infectious diseases in West Africa and infectious diseases that are peculiar to Africa as a whole.

In addition, it is also expected that the NMIMR, as the foremost medical research institute in Africa that has continuously contributed to the promotion of medical research in the African region, will continue its development through collaborative research with foreign institutes.

## **(2) Human Resources Development**

The NMIMR has disseminated its research outputs to health personnel through the ICTP and TCTP in the field of EPI vaccines, TB, HIV/AIDS and parasitology.

The NMIMR has continued EPI training for neighbouring countries in cooperation with WHO after the termination of JICA cooperation. The NMIMR also conducted training for TB in cooperation with the NTP. Therefore, it is concluded that the NMIMR is adequately fulfilling its role as a training institute for health care personnel from Ghana and the neighbouring countries. As an affiliated institute of the University of Ghana, the most important role of the NMIMR is to promote and foster the next generation researchers.

In addition to the training activities mentioned above, the NMIMR also implements training activities in medical research for students from Ghana and other countries. In addition, the senior staff members of the institute also serve as lecturers at the University of Ghana. It is expected that the NMIMR will contribute to foster health personnel in Ghana in the future. In addition, as a stronghold of TCTP, the NMIMR is expected to conduct training such as on diagnosis methods for EPI diseases and parasite control in cooperation with JICA and other donor agencies.

## **(3) Contributions to the Health Services**

The NMIMR's research findings are utilized by the MOH and relevant institutions through the Annual Research Meetings. In addition, the NMIMR also contributes to improving the health services by implementing surveillance and reference tasks, and by evaluating diagnostic kits.

In particular, in the field of surveillance and reference work, the NMIMR provides technical services that other institutes are not able to provide. Surveillance services, such as the potency testing of EPI vaccines and the drug resistance of malaria should contribute to improving the infectious diseases control programs of the MOH. In addition, the NMIMR has an important role in implementing infectious diseases control as a reference laboratory for polio, HIV/AIDS and TB.

It is expected that the NMIMR will continue to conduct research, surveillance and reference services that are directly linked to infectious diseases control in Ghana.

The expected roles of the NMIMR in infectious diseases control in Ghana are summarized in Table 4.19.

**Table 4.19 Expected Role of the NMIMR on Communicable Diseases Control**

Areas	Roles
Research	<ul style="list-style-type: none"><li>➤ Research targets are viral, bacterial and parasitic infectious diseases.</li><li>➤ Epidemiological surveys and studies</li><li>➤ Improving diagnostic methods in classical and modern technology, such as isolation and identification with regard to basic techniques, and molecular level and genetic analysis in a P-3 biosafety laboratory using advanced technology</li><li>➤ Clinical trials in vitro and in vivo such as on drug resistance and sensitivity</li><li>➤ Evaluation of research and study results or outcomes</li><li>➤ Collaborative studies with institutes, universities and hospitals within the country or overseas</li></ul>
Human resources development	<ul style="list-style-type: none"><li>➤ Laboratory practice for students of medical schools, faculty of sciences and medical vocational schools</li><li>➤ Re-training in diagnostic techniques for medical workers</li><li>➤ Technical transfer of diagnostic experimental methods and QC to researchers</li><li>➤ Collaborative research with institutes and universities within the country or overseas</li><li>➤ Third-Country Training for EPI vaccines and parasite control</li><li>➤ Giving lectures in the medical schools and courses by researchers.</li></ul>
National / Regional Health Services	<p><b>【Surveillance Services】</b></p> <ul style="list-style-type: none"><li>➤ Conducting potency test for the EPI vaccines based requests from the MOH</li><li>➤ Dispatch of staff to organise Rapid Response Teams for national preparedness in the event of a major disease outbreak.</li></ul> <p><b>【Reference Services】</b></p> <ul style="list-style-type: none"><li>➤ Reporting to the MOH as a national reference laboratory</li><li>➤ Reporting to WHO as a collaborating centre</li><li>➤ QA for HIV testing and TB microscopy.</li></ul> <p><b>【National control and other tests】</b></p> <ul style="list-style-type: none"><li>➤ Technical evaluation off HIV test kits and anti-snake venom serum test kits.</li></ul> <p><b>【Others】</b></p> <ul style="list-style-type: none"><li>➤ Technical advice and consultations for the MOH/GHS</li></ul>

Prepared by the investigation

**Annex 4.1 Main Activities of the NMIMR-JICA Programs**

	<b>Korle Bu Hospital*1</b>	<b>NMIMR Project</b>	<b>NMIMR Project II + FU</b>	<b>Infectious Diseases Project</b>	<b>West African Centre for International Parasite Control Project</b>
<b>Malaria</b>	<ul style="list-style-type: none"> <li>➤ Technical transfer on the classification and identification of Anopheles vectors.</li> </ul>	<ul style="list-style-type: none"> <li>➤ Malaria infection, morbidity and antibody levels in infants in the Gomoa district.</li> <li>➤ Plasmodium falciparum sensitivity to chloroquine and other ant-malaria drugs in the Central, Volta, Upper East, and Brong Aharo regions.</li> </ul>			
<b>Epidemiology</b>	<p>The following activities in the Gomoa district:</p> <ul style="list-style-type: none"> <li>➤ Establishment of health facilities</li> <li>➤ Collection of samples for research.</li> <li>➤ Study on vaccination.</li> </ul>	<p>The following activities in the Gomoa district:</p> <ul style="list-style-type: none"> <li>➤ Epidemiological surveillance of communicable diseases and determination of the causative agents of diseases (including diarrhoea)</li> <li>➤ PHC activities</li> <li>➤ Clinical trials of heat stable Acellular Pertussis Diphtheria Tetanus (APDT) vaccine.</li> </ul>			
<b>Nutrition / Diarrhoea Diseases</b>	<ul style="list-style-type: none"> <li>➤ Transfer of basic technology through amino acid analysis, quantitative analysis of metals, comparison for quantity of metals among various disease patients</li> <li>➤ Relation between diarrhoea and malnutrition</li> </ul>	<ul style="list-style-type: none"> <li>➤ Analysis of nutrients in food, blood and body tissues</li> <li>➤ Improvement of the nutritional status of infants through appropriate weaning foods</li> <li>➤ Determination of the prevalence of Vitamin A deficiencies and anaemia</li> </ul>	<ul style="list-style-type: none"> <li>➤ Persistent diarrhoea in childhood</li> <li>➤ Nutrition and persistent diarrhoea</li> <li>➤ Persistent diarrhoea and immune dysfunction</li> <li>➤ Immuno-competence in protein-energy malnutrition.</li> <li>➤ Cereal based-ORS study</li> </ul>		
<b>General Subjects</b>	<ul style="list-style-type: none"> <li>➤ Sample preparation for the electron microscope</li> <li>➤ Study on morbidity changes, antigens for yellow fever, leptospirosis</li> </ul>	<ul style="list-style-type: none"> <li>➤ Serological diagnosis for human retroviruses, yellow fever virus, measles virus, rubella virus, and polio virus</li> <li>➤ Establishment of virus isolation techniques and epidemiological analysis of virus infectious diseases</li> </ul>			
<b>VPD</b>		<ul style="list-style-type: none"> <li>➤ Potency tests for polioviruses, measles virus, and yellow fever virus vaccine (in cooperation with MOH &amp; UNICEF)</li> <li>➤ Monitoring of the effectiveness of imported cold chain vaccines</li> <li>➤ Assessment of a rise in antibodies after vaccination with polioviruses</li> <li>➤ Evaluation of WHO recommended the four doses schedule of vaccination for poliovirus at birth</li> <li>➤ Evaluation of the two doses schedule of the double normal dose of the poliovirus vaccine</li> <li>➤ Comparison of seroconversion rates of poliovirus vaccination</li> </ul>	<ul style="list-style-type: none"> <li>➤ Evaluation of the effectiveness of DTP vaccines by epidemiologic and immunologic methods</li> <li>➤ Investigation of the effectiveness of various measles vaccines and the determination of the appropriate timing for vaccination</li> <li>➤ Evaluation of the acquisition of immunity after the administration of EPI vaccines in malnourished and immunocompromised children, and to determine the appropriate schedule of vaccination among both healthy and immunocompromised hosts</li> <li>➤ Development of a vaccine quality control system</li> </ul>	<ul style="list-style-type: none"> <li>➤ Viral haemorrhagic fever antibody tests (yellow fever virus IgM, IgM of dengue fever virus, and IgG, Ebola, Marburg, and Lassa fever virus, etc.).</li> <li>➤ Introduction of RT-PCR techniques to identify virus genomes in mosquitoes</li> <li>➤ Establishment of a community-based surveillance system in the Dangme East District for measles</li> <li>➤ Clarification of the cytokine profiles in plasma, changes in the population of lymphocyte surface markers and apoptosis related events, during and after measles infection for the better understanding of immuno-suppression after measles infection</li> </ul>	
<b>HIV/AIDS STD</b>			<ul style="list-style-type: none"> <li>➤ Transfer of the diagnostic techniques for the determination of HIV-1,2 (and HTLV-1) infections</li> <li>➤ Research on the epidemiology and transmission of HIV infections</li> <li>➤ Virus isolation in cell culture and characterization of the isolated viruses</li> </ul>	<ul style="list-style-type: none"> <li>➤ Research on the molecular and antigenic characterization of HIV strains</li> <li>➤ Introduction of protease inhibitor susceptibility tests</li> <li>➤ Establishment of standardized diagnostic methods for HIV/AIDS and QC/QA for HIV testing in collaboration with the MOH</li> <li>➤ Characterization of etiological agents for STD</li> <li>➤ Technical transfer of</li> </ul>	

	Korle Bu Hospital*1	NMIMR Project	NMIMR Project II + FU	Infectious Diseases Project	West African Centre for International Parasite Control Project
				diagnostic methods for C. trachomatis.	
<b>Tuberculosis</b>				<ul style="list-style-type: none"> <li>➤ Technical transfer of smear preparation, culture, mycobacterium species identification, and drug susceptibility testing</li> <li>➤ Establishment of a reference laboratory</li> </ul>	
<b>Schistosomiasis</b>			<ul style="list-style-type: none"> <li>➤ Analysis of the present status of schistosomiasis prevalence in Ghana in collaboration with the MOH</li> <li>➤ Examination of basic epidemiological, socio-cultural, economic and behaviour factors associated with schistosomiasis in defined communities</li> <li>➤ Examination of the effectiveness of combined control measures for schistosomiasis.</li> <li>➤ Development of effective molluscicides</li> <li>➤ Studies on the different strains of S. haematobium</li> <li>➤ Development of immunodiagnosis</li> </ul>	<ul style="list-style-type: none"> <li>➤ Production and screening of anti-schistosome monoclonal antibodies</li> <li>➤ Identification of Schistosoma haematobium resistant individuals to analyse their sera for protective antibodies</li> <li>➤ Molecular cloning of S. haematobium vaccine candidates</li> </ul>	<ul style="list-style-type: none"> <li>➤ Establishment of WACIPAC.</li> <li>➤ Establishment of a model project for school-based parasitic disease control</li> <li>➤ In-country and third-country training</li> <li>➤ Establishment of an information network within the West Africa</li> <li>➤ Promotion of the advocacy of school-based parasitic diseases control</li> <li>➤ Implementation of start-up activities on school-based parasitic diseases control in the supporting sites</li> </ul>
<b>Laboratory animals</b>				<ul style="list-style-type: none"> <li>➤ Conformation with SPF status specifications</li> <li>➤ Conformation with specific genetic profiles of the strains</li> <li>➤ Establishment and characterization of grasscutter colonies</li> </ul>	
<b>Biosafety</b>				<ul style="list-style-type: none"> <li>➤ Biosafety level 3 facility guidelines</li> <li>➤ Biosafety manual</li> <li>➤ Training</li> <li>➤ Reporting and countermeasures system for biohazard accidents</li> <li>➤ Organization of biosafety related committees</li> </ul>	

Prepared by the investigation team

## **5 Analytical Findings on the Kenya Medical Research Institute in Kenya**

This chapter comprises four sections, and it presents the analysis of the contribution of Kenya Medical Research Institute (KEMRI) to infectious diseases control and the effect of JICA's cooperation, which made possible the contribution of KEMRI. JICA's assistance to KEMRI is summarized in Section 5.1. Section 5.2 gives a summary outline of infectious diseases control in Kenya, including the role and functions of KEMRI in infectious diseases control. Based on these findings, the effects of JICA's assistance that enabled KEMRI to contribute to infectious diseases control are analysed as described in Section 5.3. The results of this analysis are summarized in Section 5.4 in terms of the expected role of KEMRI.

### **5.1 Summary of JICA Cooperation with the KEMRI**

#### **5.1.1 Background History to the Cooperation**

The leading causes of morbidity and mortality in Kenya in 1975 were related to infectious diseases such as malaria, measles, varicella and diarrhoea. In 1976, the Government of Kenya (GOK) requested from the Government of Japan technical assistance that aimed to conduct research on public health, especially research on infectious diseases in order to improve the health situation.

JICA started project type technical cooperation on infectious diseases control, namely the Communicable Diseases Research and Control Project in March 1979. The Project was implemented in cooperation with several agencies under the Ministry of Health (MOH), such as the National Public Health Laboratory Services (NPHLS) and the Division of Vector Borne Diseases (DVBD). The Kenya Medical Research Institute (KEMRI) was established in 1979, and joined the JICA project as one of the counterpart agencies. KEMRI has been the main partner in JICA projects since the main facilities at KEMRI were completed with Japanese Grant Aid in 1981.

JICA has continuously implemented project type technical cooperation with KEMRI, and there were seven projects implemented up to 2004 (Research and Control of Infectious Diseases Project and the International Parasite Control Project, which resulted from a division of the Research and Control of Infectious and Parasitic Diseases Project). The Government of Japan further supported the development of facilities and equipment at KEMRI through the implementation of grant aid projects, including the Kenya Medical Research Institute Development Project in the Republic of Kenya in 1981/82 and the Project for Improvement of the Kenya Medical Research Institute in the Republic of Kenya in 1997. Thus, a series of cooperation projects involving KEMRI were implemented strategically by adopting various schemes for ODA.

#### **5.1.2 Outline of KEMRI**

##### **(1) Mandate of KEMRI**

KEMRI was established in 1979 under the Science and Technology (Amendment) Act. Under this Act, the Kenya Medical Research Institute was charged with the

responsibility of carrying out health research, and their mandate under the Act is as follows:

- To carry out research in the field of biomedical sciences
- To co-operate with other organizations and institutions of higher learning in training programmes and on matters of relevant research
- To liaise with other research bodies within and outside Kenya carrying out similar research
- To disseminate research findings
- To co-operate with the Ministries responsible for research, such as the Ministry of Health, the National Council for Science and Technology, and the Medical Science Advisory Committee on matters pertaining to research policies and priorities
- To do all such things as appear necessary, desirable or expedient to carry out its functions

## (2) Organization of KEMRI

### 1) Management System of KEMRI

KEMRI, which consists of 11 research centres focused on certain specific areas, is the largest medical research institute in Kenya.

KEMRI is governed by a Board of Management appointed by the Minister that is for the time being responsible for research. The Board consists of a Chairman, six appointed members, and representatives from various government Ministries, Departments and Agencies. The Board is responsible for all the policy matters of the Institute.

There are a number of standing committees of the Board that perform some specialised functions shown in Table 5.1:

**Table 5.1 Roles of Standing Committees**

Committees	Roles
Scientific Programmes Committee (SPC):	Responsible for scrutinising, evaluating and approving research performance and the output of research projects.
Staff Establishment and Appraisal Committee (SEAC):	Reviews staff needs and determines staff promotion and employment, as necessary.
Finance Committee (FC):	Responsible for the financial and development needs of KEMRI.

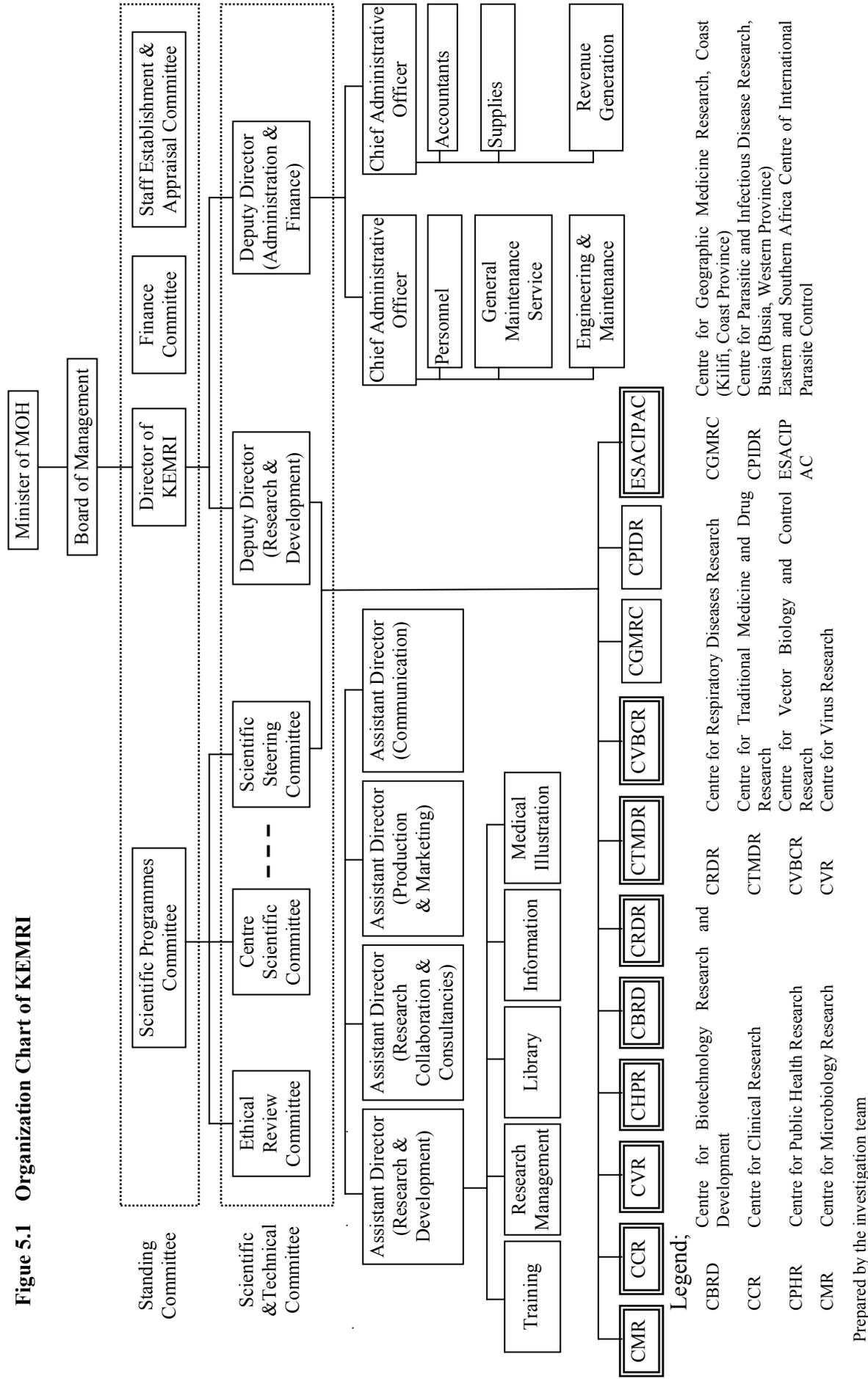
Source: KEMRI (1998), Guideline on the Conduct of Research

Under the Standing Committees, there are 11 scientific and technical committees to assess research projects from various points of view, such as ethics, hazards, equipment management, human resources management and specialized programmes. Among these, the Scientific Steering Committee (SSC) is the main body that comprises all the directors of the research centres. SSC meetings are held at least every 6 months to review and approve all research projects. The Centre Scientific Committee (CSC) reviews all proposals and manuscripts at each centre.

Besides these 11 committees, there are Programme Committees (PCs) dealing with specific research areas taking into consideration national strategies and various diseases. The PCs include 21 committees, such as those covering acute respiratory infections research, diarrhoeal research and health systems research. PCs consider the relevance of research activities at KEMRI from the comprehensive viewpoints of health administration, including policy aspects with the officials of the relevant agencies assigned as members of the committees.

The organization chart of KEMRI is shown in Figure 5.1.

**Figure 5.1 Organization Chart of KEMRI**



## **2) Research Management**

The scientific and technical committee of KEMRI summarises the criteria for choosing the research, monitors the research process and evaluates the research outputs through its “Guidelines on the Conduct of Research”. KEMRI adopts research proposals from the viewpoint of relevance and feasibility in line with the guidelines.

Relevance: the national programme and the mandate of KEMRI.

Feasibility: appreciation of the manpower and technical level, financial resources, terms of the research, theoretical and practical methods.

These criteria are adopted for collaborative research with foreign institutes. All research projects implemented by KEMRI are adopted on the basis of relevance to health policy by the scientific and technical committee to which a representative of the Ministry of Health (MOH) is also assigned.

## **3) Reflection of Research Outputs in Health Administration**

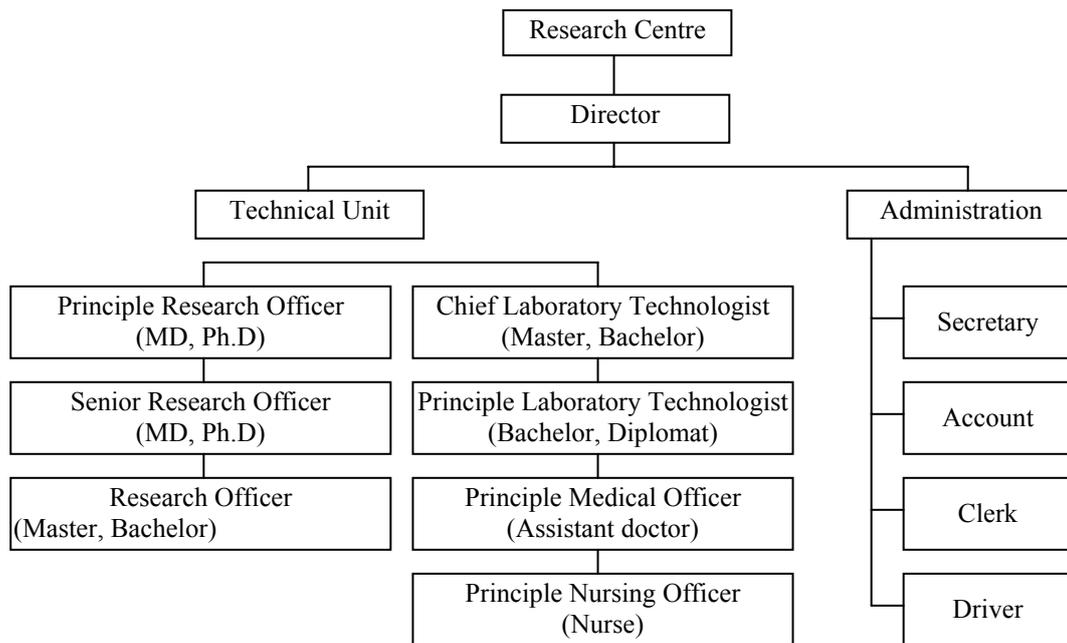
KEMRI maintains communication channels with the MOH in order that its research outputs are reflected in health administration. Research outputs are periodically reported to the MOH through the technical committee. In addition, the director of KEMRI directly reports to the MOH on the research outputs when the research outputs are greatly needed or urgently required. The MOH also requests KEMRI to conduct research on urgent epidemiological subjects.

Thus, KEMRI has established a system for reflecting the research outputs in health administration involving the MOH and KEMRI. This system enables KEMRI to form optimal linkages to act for rapid and global infectious diseases control.

## **4) Structure of the Research Centres**

Each of the 11 centres consists of an administration and a technical unit. The technical unit includes researchers who have a doctors’ or masters’ degree at least. Many senior researchers have a Ph.D degree in sciences rather than being medical doctors. The technologists are mainly undergraduates of science courses from universities, and personnel who have medical licenses such as assistant doctors and nurses are also assigned to this position. Many of the technologists are employed from the Kenya Medical Training College (KMTC). KEMRI has a close relationship with KMTC in which researchers from KEMRI give lectures at KMTC, and the students of KMTC also take practice courses at KEMRI (see Figure 5.2).

**Figure 5.2 General Structure of the Research Centre**



Prepared by the investigation team

### 5.1.3 Outline of JICA Cooperation with KEMRI

#### (1) Objectives and Components of JICA's Cooperation

Based on the results of studies, it is to be expected that the series of JICA cooperation projects has aimed to strengthen the research capacity of KEMRI. Human resources development in the health sector has been added as an additional objective of JICA's cooperation, and workshops/seminars aimed at disseminating the research outputs to other medical organizations were started in 1990.

As shown in Table 5.2, JICA started technical assistance for infectious diseases control under the Communicable Diseases Research and Control Project in March 1979, before KEMRI was established. As of July 2004, when this evaluation study was being implemented, JICA had implemented a total of seven project-type technical cooperation activities. In addition to technical cooperation, since 1999, JICA has implemented third-country training programmes (TCTP) two times at KEMRI, which acted as a counterpart institution. This evaluation study considers this technical cooperation and the TCTPs to be part of a series of cooperation activities with KEMRI, and hence this evaluation is conducted accordingly.

**Table 5.2 Target Projects for Evaluation**

Project name	Scheme	Project Period
Communicable Diseases Research and Control Project <sup>*1</sup>	TCP	1979.3~1984.3
Project on the Kenya Medical Research Institute	TCP	1985.4~1990.4
Project on the Research and Control of Infectious Diseases	TCP	1990.5~1996.4
Research and Control of Infectious Diseases Project Phase II	TCP	1996.5~2001.4
Research and Control of Infectious and Parasitic Diseases Project <sup>*2</sup>	TCP	2001.5~2003.4
Research and Control of Infectious Diseases Project	TCP	2003.4~2006.4
International Parasite Control Project	TCP	2003.4~2006.4
Blood Screening for Viral Hepatitis and HIV/AIDS	TCTP	1999~2001 / 2003
Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC)	TCTP	2002~2006

Legend: TCP Technical Cooperation Project

TCTP Third Country Training Programme

Note: \*1 The project was implemented under the National Public Health Laboratory Service before the facilities of KEMRI had been built.

\*2 "Research and Control of Infectious and Parasitic Diseases Project" has been divided into two technical cooperation projects, namely the "Research and Control of Infectious Diseases Project" and the "International Parasite Control Project," since April 2003.

Prepared by the investigation team

The contents of JICA's technical cooperation at KEMRI are summarised in Table 5.3.

**Table 5.3 Components of JICA's Technical Cooperation at KEMRI**

	78	80	85	90	95	00	05	06
Main changes in health sector in Kenya		EPI was started. EPI covered all districts▲	▲ Restriction of health sector (USAID programme)	▲ Restriction of health sector (USAID programme)		Revise of the National Health Strategic Plan ▲		
	National AIDS Committee was established▲	National AIDS Control Programme was started.▲	Starting USAID-JAPAN Partnership▲			Revise of KEMRI Master Plan ▲		
JICA Technical Cooperation Projects	The Control of Diarrhoea Disease Program was started.▲							
	Communicable Disease Research and Control Project ➤ Viral Diarrhoeal Diseases ➤ Bacterial Diarrhoeal Diseases ➤ Parasites	Project of Kenya Medical Research Institute ➤ Viral Diarrhoeal Diseases ➤ Viral Hepatitis ➤ Bacterial Diarrhoeal Diseases ➤ Parasites	Project on Research and Control of Infectious Disease ➤ Viral Diarrhoeal Diseases ➤ Viral Hepatitis ➤ Bacterial Diarrhoeal Diseases ➤ Parasites	Research and Control of Infectious Disease Project II ➤ HIV/AIDS ➤ ARI ➤ Viral Hepatitis	Research and Control of Infectious and Parasitic Disease project ➤ Blood safety ➤ Opportunistic infections. ➤ Parasites			
Third Country Training Programme						Blood screening		ESACIPAC
Grant Aid	Construction of Facility			Improvement of facility				
Objectives of JICA Programme			Improvement of research capability					
			Development, production and dissemination of diagnosis kits					
			Strengthening of training capability					
							Stronghold in the East Africa	
Role of KEMRI in the country / Africa region.	Institute belonging to MOH	Belonging to MRDST	Belonging to MRTTT					National Medical Research Institute belonging to MOH
	▲ Joint researches were started with Waller reed and CDC		▲ Joint researches were started with Wellcome Trust at Kilifi					▲HQ of the African Forum for Health Sciences

Prepared by the investigation team

## (2) Components of JICA Cooperation according to the Diseases

As shown in Table 4.3, each project targeted several diseases and research on specific diseases that occurred during a period covering several projects. In consideration of this situation, project activities have been reshuffled on the basis of the incidence or occurrence of the diseases.

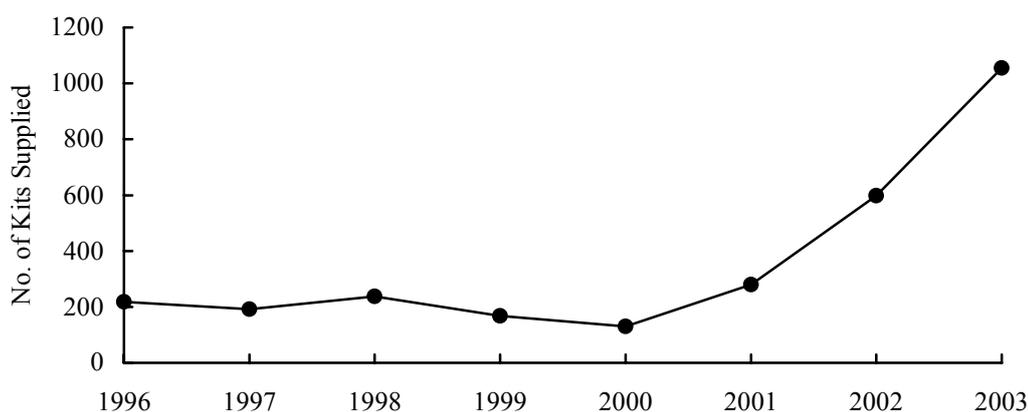
A series of JICA technical cooperation activities targeted diarrhoea, acute respiratory infection (ARI), hepatitis, HIV/AIDS, schistosomiasis, and filariasis. Components of JICA technical cooperation are summarized below: (activities of each project, inputs by JICA such as the dispatch of experts, C/P training and equipment provision are in the attached annex).

### 1) Hepatitis

Hepatitis B Virus is a major cause of liver disease in Kenya. Infection by the virus may be associated with chronicity, cirrhosis and hepatocellular carcinoma. WHO recommended that blood for transfusions must be screened for HBV, HIV and *Treponema palladium*, among other pathogens.

All blood diagnostic kits utilized in Kenya, including the kit for Hepatitis B, were imported when JICA started research cooperation on Hepatitis in 1985. Therefore, besides the epidemiological study of hepatitis, KEMRI focused on the prevention and control of viral Hepatitis B through the development and dissemination of a diagnostic kit for Hepatitis B (HEPCELL II). HEPCELL II was approved as the official test kit for Hepatitis B by the GOK in 1992, thus, KEMRI supplied provincial and district hospitals with HEPCELL II, and also conducted TCTP and ICTP on the use of HEPCELL II. HEPCELL II has been distributed to public hospitals by the National Public Health Services (NPHLS) since 2003.

**Figure 5.3 Number of HEPCELL Kits Supplied**



Note: A kit consists of reagents for 200 tests.  
Prepared by the investigation team

As Figure 5.3 shows, the supply of HEPCELL II fluctuated in the range of 130 - 200 kits over the period 1996 - 2001. After 2002, the supplied volume increases rapidly and reached 1,055 kits in 2003. KEMRI reported that public hospitals in rural areas

screened 69,373 units of blood for transfusions over the period 1996 - 2000. In addition, the Alpha Feto Protein detection test kit for the detection of Hepatitis C Virus (HCV) was developed, and an HCV-antibody detection kit is being developed by KEMRI.

In addition, an exchange of notes was made on 4 August 2004 between the Government of Japan and GOK for establishing mass production facilities for blood test kits at KEMRI.

## **2) HIV/AIDS**

The number of HIV/AIDS infected people has rapidly increased since the first case of AIDS was diagnosed in a patient in 1984. UNICEF reported that by the year 1992 there would be more than 24,000 people infected with HIV/AIDS. To counter the AIDS problem, a National AIDS Committee was established in 1985, and a National AIDS Control Programme was started in 1986. In addition, the Kenya government has positioned HIV/AIDS as a critical issue during the seventh national three-year study (1994 - 97).

In view of this situation, GOK requested the implementation of the Research and Control of Infectious Diseases Project Phase II, including HIV/AIDS as a new target disease. As a result, JICA started activities on HIV/AIDS in 1996.

Regarding cooperation for HIV/AIDS control, a diagnostic kit for HIV, namely Particle Agglutination (PA) for HIV-1 was developed. Because a study by KEMRI showed that there is only the HIV-1 strain in Kenya, the PA kit focused on only HIV-1, but not on HIV-2. However, owing to the fact that it is a WHO requirement that HIV diagnostic kits should be able to detect both HIV-1 and HIV-2, KEMRI has started the development of a new blood test kit called KEMCOM, which is able to detect both HIV-1 and 2 at the same time.

Besides the development of diagnostic kits, KEMRI has also implemented the screening of anti-viral medicinal plants and a cohort study for mother to child transmission in West Kenya (Kisumu, Busia). The cohort study in Western Kenya was modified as a public health education activity and is continuing to be implemented in 2004.

In addition, the TCTP mentioned above also included HIV/AIDS.

## **3) Parasitology**

### **a. Schistosomiasis**

The endemic area for Schistosomiasis expanded to irrigation areas in Kenya. WHO established a specific committee for Schistosomiasis control in Kenya in 1987, and DANIDA/WHO assisted in providing dose curatives for Schistosomiasis to students in primary schools in the Coast Province in the 1990s.

In cooperation with JICA, KEMRI also conducted studies for Schistosomiasis control from 1979 to 1996 in Mwachinga village and Mtsangatamu village in the Kwale district, Coast Province. The control measures employed included mass-chemotherapy, health education, environmental modification for control of the vector snails, and the provision of safe water facilities.

The activities under JICA's cooperation in these villages were terminated in 1995. However, the series of activities mentioned above have been continued by the villagers, except for the environmental modifications and the operation of safe water facilities due to the capacity of the communities. Therefore, an NGO has implemented a safe water supply project using the water sources developed by the JICA project.

#### **b. Filariasis**

Filariasis is one of the most important diseases in the Coast Province from the viewpoint of public health. However, research activities have stagnated since 1985, after termination of the research on filariasis control by the Netherlands.

In view of this situation, JICA started to cooperate in a study on filariasis control from 1990 to 1996 based on a request from GOK.

This study aimed to see the infection development of filariasis from its epidemiological aspects and to investigate effective control measures, as well as the improvement of diagnosis, the detection of the prevalent range and the development of mass-chemotherapy that was carried out in the field research on schistosomiasis. However, the need for filariasis control was not realized by the village people, due to the fact that few symptoms of filariasis appear during the incubation period. Thus, the consensus of the community to undergo mass-chemotherapy treatment also could not be developed during the study period.

#### **c. Parasite Control through the School Health Approach**

Based on the Hashimoto Initiative, the Eastern and Southern Africa Centre of International Parasite Control (ESACIPAC) was established as a training and research centre for developing human resources and implementing model projects on parasitic diseases control through the school health system.

The ESACIPAC aims to strengthen the parasite control programmes in participating countries through human resources development and to promote preventive measures through the school health approach. In contrast with the former activities, which targeted particular parasites, ESACIPAC targets multiple parasites (Lymphatic Filariasis, Malaria, Schistosomiasis and Soil Transmitted Helminthiasis) through parasite control in schools. ESACIPAC has implemented model projects on parasite control targeting 87 schools in the Mwea district, Central province, and 10 schools in the Kwale district, Coast Province, since 2003. Besides these pilot studies, ESACIPAC conducted two TCTPs in 2003 and 2004. There were 33 participants who attended these TCTPs from 10 countries, including Kenya.

### **4) Diarrhoeal Diseases**

Diarrhoeal diseases are one of main groups of diseases in Kenya, and JICA projects also studied diarrhoea from 1979 to 1996. Diagnostic techniques for viral and bacterial diarrhoea were transferred to KEMRI at the initial stage of JICA's cooperation, and then research activities using these diagnostic techniques were started. Besides these studies, KEMRI conducted actual practical measures such as

the selection of affordable and effective antibiotics and the provision of medicines on the occasion of an outbreak of cholera/dysentery in Mombasa, and also conducted educational activities to prepare brochures and video programmes for diarrhoea control. The research activities on diarrhoeal diseases by KEMRI were terminated in 1996 when the Project on Research and Control of Infectious Diseases was terminated.

### **5) ARI**

ARI was the cause of more than 25% of the infant mortality in Kenya in the middle of the 1990s. Techniques for etiological studies on bacterial, fungal and viral ARI, and sensitivity tests for major bacterial and fungal ARI were transferred through JICA's cooperation activities from 1996 to 2001. In addition, KEMRI prepared education materials such as educational videos and more than 400 brochures, and conducted community-based health education in Kibera, Nairobi, using these materials from 1996 to 2001. However, KEMRI's activities on ARI were also terminated in 2001 when the Research and Control of Infectious Diseases Project Phase II was terminated.

### **6) Opportunistic Infections**

In Kenya, the increase in HIV associated with opportunistic infections has also become a problem. JICA's cooperation started the research on opportunistic infections since 2001, based on the microorganism research technologies and treatment experiences cultivated in ARI. The study targeted *Mycobacterium*, *Pseudomonas*, and *Pneumocystis carinii* for the respiratory system, and *Salmonella*, *Shigella*, enteropathogenic *Escherichia coli* and *E. candidasis* for the enteric system, and surveys on HIV/AIDS-infected orphanages.

## Outline of Infectious Diseases Control in Kenya

A summary outline of infectious diseases control in Kenya is given as follows to clarify the roles and functions of KEMRI as a research institute for infectious diseases control in Kenya.

### **5.2 Outline of Communicable Diseases Control in Kenya**

An outline of infectious diseases control in Kenya is given below to clarify the roles and functions of the KEMRI as a research institute for infectious diseases control in Kenya.

#### **5.2.1 Structure of Diseases**

Infectious diseases are still the main issue for disease control in Kenya since the leading causes of morbidity and mortality are related to infectious diseases, such as malaria, acute respiratory infections (ARI) and diarrhoea in 2003. Significant progress has been made in the eradication of poliomyelitis, the elimination of neonatal tetanus and the control of measles. The targets for the eradication of guinea worm disease and the elimination of lymphatic filariasis and leprosy have been attained. Other parasitic diseases of epidemiological concern, such as schistosomiasis, helminthiasis, leishmaniasis, will need to be addressed. However, new emerging and re-emerging diseases continue to be threats.

Malaria has remained the leading cause of morbidity and mortality. According to the statistics of MOH, it accounts for 30% of outpatient visits and about 19% of all cases requiring inpatient services were infected with malaria. Malaria causes 5% of the total number of deaths in public health facilities. ARI are the second leading cause of morbidity, accounting for up to one quarter of outpatient attendance at public health facilities. Diarrhoeal diseases are the third leading cause of morbidity as well as mortality, especially among children. Regarding HIV/AIDS, it is estimated that since the epidemic commenced in 1984, 1.5 million deaths have occurred, resulting in approximately one million orphans in Kenya. By the year 2000, over 2.2 million people in Kenya had been infected with HIV with a seroprevalence rate of 14%. Recent data indicate a possible stabilization and decline in national seroprevalence. Tuberculosis (TB) shows a high prevalence rate among impoverished groups. The directly observed treatment short-course (DOTS) has been adopted as a national strategy in Kenya. The coverage of resistance to multi-drug therapy was insignificant.

#### **5.2.2 Communicable Diseases Control by the MOH**

##### **(1) Development Plans in the Health Sector**

Kenya built a health system in the early stages that is comparable to those of neighbouring countries, and provided relatively stable medical services. However, funding sources for health services have seen shortfalls due to the rapid increase in the population and the spread of AIDS in the 1990s. Thus, the poverty gap also expanded with the deterioration in economic conditions. The Interim Poverty Reduction Strategy Paper (IPRSP) 2000 – 2003, which was drawn up by the GOK,

determined that the control of HIV/AIDS is central to an effective poverty reduction strategy. The GOK has declared AIDS a National Disaster. Consistent with this, the MOH proposed the implementation of HIV/AIDS control activities to achieve the objectives of preventing the transmission of HIV among the population with the focus on the most vulnerable groups. On the basis of the IPRSP, the MOH has drawn up the National Health Sector Strategic Plan 1999-2004, which aims to reform the health system through decentralization. In the Health Sector Strategic Plan 1999-2004, the national targets related to infectious diseases control are described as follows;

- Reduce measles morbidity by 95% and mortality by 90%.
- Reduce the incidence of neonatal tetanus to less than 1/1,000 live births with a 100% reporting rate.
- To eradicate poliomyelitis by the year 2000 and certification by 2005.
- Reduce malaria morbidity and mortality rates by 30%.
- Reduce the HIV prevalence rate from the current 13-14% by 10% and STD prevalence by 50%.
- Reduce under-5 morbidity and mortality attributable to measles, pneumonia, diarrhoea, malaria, and malnutrition from 70% to 40%.

To tackle these targets, the service delivery consists of national priority packages that are ranked by data on the burden of the disease, cost-effectiveness of the interventions, the impact of interventions and health outcomes in relation to health expenditures. Six high priority packages are mostly related to infectious diseases control and concern morbidity and mortality among those under 5 years old (see Table 5.4).

**Table 5.4 National Priority Packages**

High priority packages	Medium priority packages	Low priority packages
<ul style="list-style-type: none"> <li>➤ Malaria prevention and treatment package</li> <li>➤ IMCI package</li> <li>➤ Reproductive health package</li> <li>➤ HIV/AIDS/TB prevention and management package</li> <li>➤ EPI</li> <li>➤ Control and prevention for major environment-related communicable diseases (cholera, dysentery, typhoid and food safety control)</li> </ul>	<ul style="list-style-type: none"> <li>➤ Non-communicable diseases (cardiovascular diseases, diabetes, rheumatic fever)</li> <li>➤ Reproductive cancers (cervix, breast, scrotal cancers)</li> <li>➤ Mental health/drug and substance abuse</li> <li>➤ Injuries and accidents</li> <li>➤ Control of other vector borne diseases</li> </ul>	<ul style="list-style-type: none"> <li>➤ Eye infections</li> <li>➤ Skin infections</li> <li>➤ Ear infections</li> <li>➤ Worm infections</li> </ul>

Source: Ministry of Health (1998), National Health Sector Strategic Plan 1999-2004

The National Health Sector Strategic Plan 2005-2010 is in the process of determination in 2004 and addresses the Millennium Development Goals (MDGs), the National Economic Recovery Strategy, and the Poverty Reduction Strategy. The MOH plans to finalize the National Health Sector Strategic Plan 2005-2010 by

November 2004, and national strategies for infectious diseases control will be continued as they are.

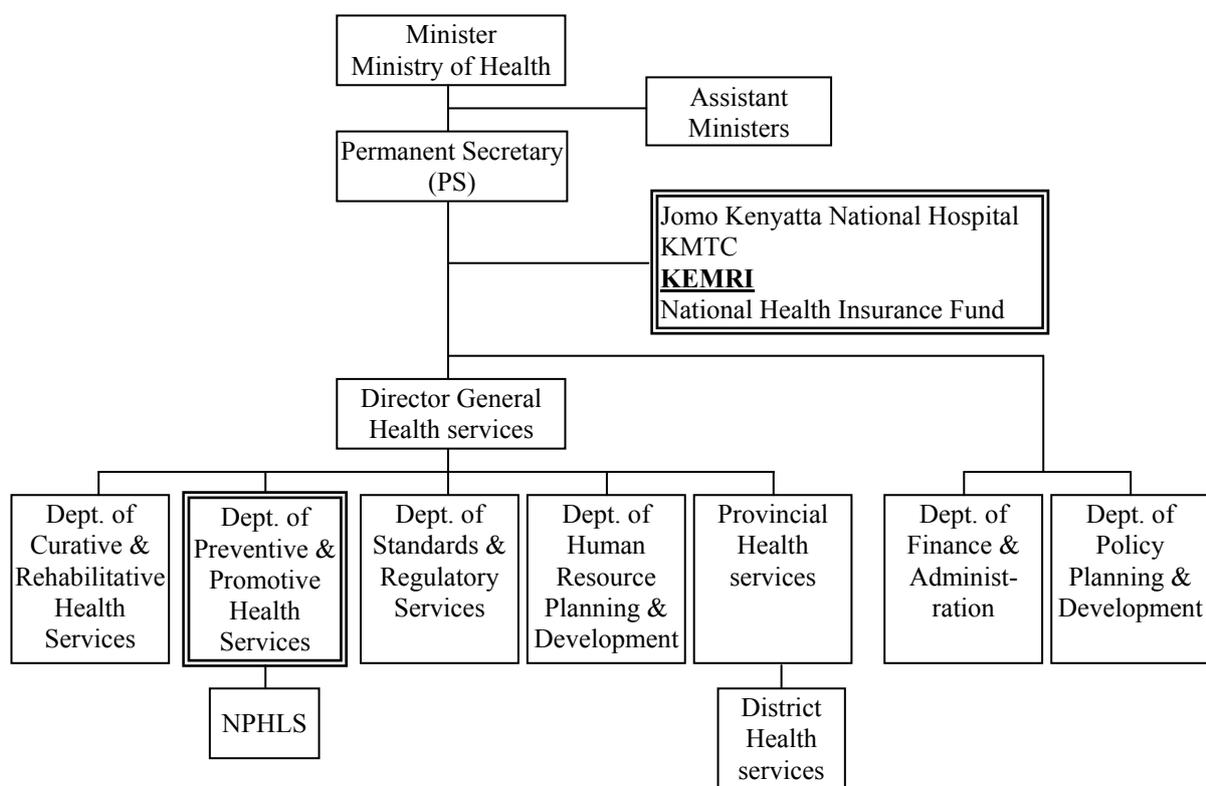
## **(2) Implementation Structure for Communicable Diseases Control**

The MOH has six departments, and the Department of Preventive and Promotive Health Services (PPHS) is the responsible department for infectious diseases control. PPHS has responsibility to implement measures against all diseases, and the divisions of PPHS are divided as follows for conducting measures against diseases that are effectively given high priority under the National Health Sector Strategic Plan (1999-2004).

- Division of communicable and vector borne diseases control:  
To draw up infectious diseases control programmes except for HIV/AIDS-related diseases. In addition, this division manages the National Malaria Control Programme (2005-2010) and Vector Borne Diseases Strategic Plan (2005-2010).
- Division of environmental health services:  
To draw up control programmes against water borne and soil related infectious diseases, and to improve the living standards.
- Division of primary health care:  
To draw up control programmes related to PHC, such as reproductive health, maternal and child health, and immunization.
- Division of STD/AIDS/TB/leprosy:  
To draw up control programmes against HIV/AIDS as a central division for planning the National AIDS and STDs Control Programme.
- Division of health education:  
To draw up and manage the community education and school health activities in cooperation with other divisions for awareness raising and education

In line with the decentralization, programmes prepared by PPHS are implemented by health service departments in each provincial and/or district government. The main organizations related to infectious diseases control are shown in Figure 5.4.

**Figure 5.4 Main Structure of the Ministry of Health**



Source: Ministry of Health (1998), National Health Sector Strategic Plan 1999-2004

The National Public Health Laboratory Services (NHPLS) is the tertiary referral laboratory among public medical facilities, and belongs to PPHSS. There are seven main laboratories, namely, the 1) blood safety laboratory, 2) vaccine laboratory, 3) microbiology laboratory, 4) quality control/safety check laboratory, 5) medical/post-mortem laboratory, 6) food/nutrition laboratory, 7) monitoring/outbreak laboratory.

NPHLS is also responsible for the provision of all laboratory needs including various reagents and testing kits such as for HIV/AIDS, STI, malaria, diabetes, urine, etc. NPHLS makes projections of its needs each year and these are passed onto the Kenya Medical Supplies Agency (KEMSA) who tenders for the supplies and then directs them back to the MOH for procurement. However, NPHLS usually receives only about one-third of their requirements through this system and therefore all laboratory supplies have to be rationed to the provinces and districts. Supplies such as equipment are kept in KEMSA, but the reagents come to the NPHLS store in Nairobi. The logistics system for managing and distributing items requiring a cold chain is not well developed.

### **(3) National Communicable Diseases Control**

#### **1) Malaria Control**

The MOH has begun to develop the National malaria Plan Action for 1992-1997. The plan was launched and a Malaria Control Unit was set up, under the division of Vector Borne Diseases, to form the operational arm of the National Malaria Control Programmes (NMCP). A movement called “Roll Back Malaria” started by WHO, and the recognition that malaria is the highest priority for prevention and treatment, means that malaria became one of the six essential packages in the Health Sector Strategic Plan (1999-2004). The main objectives of the National Malaria strategy (2001-2010) is to reduce the level of malaria infection and the consequent number of deaths in Kenya by 30% by the year of 2006, and to sustain that improved level of control to 2010. There are four main strategic approaches; 1) clinical management: providing prompt, effective treatment, 2) management of malaria and anaemia in pregnancy, 3) vector controls using insecticide-treated nets (ITN) and other methods and 4) epidemic preparedness and response.

#### **2) HIV/AIDS and STDs Control**

HIV/AIDS was declared a national disaster, and the National AIDS Control Council (NACC) was set up in the Office of the President in 1999. The Kenya National HIV/AIDS Strategic Plan 2000-2005 has been approved by the parliament and the HIV/AIDS Control Unit was established under the PPHS. Thereafter, a NASCOP that unifies HIV/AIDS, STD, TB, and leprosy diseases was drawn up. Accordingly, the units in charge of each disease were also unified, and the unified unit itself is called NASCOP.

The concrete objectives of NASCOP are a DOTS strategy for the treatment of TB cases, blood safety, Prevent Mother and Child Transmission (PCMT), expansion of Voluntary Counselling and Testing (VCT), anti-retrovirus therapy (ARV) for opportunistic infections and home-based care and abolition of discrimination against HIV/AIDS and leprosy.

#### **3) Vector Borne Diseases Control**

To reduce parasitic infectious morbidity and mortality by developing environmental health and health promotion in the community, the division of communicable and vector borne diseases control is implementing the Vector Borne Diseases Strategic Plan 2005-2010. The main activities of the Vector Borne Diseases Strategic Plan are as follows:

- Improved prevention and control of parasitic infections
- Community mobilized and educated for the prevention and control of parasitic infections and their vectors
- Reduction of the disease vectors’ breeding sites
- Increased personal protection against parasitic infections

- Conduct of routine parasitological and entomological surveillance for the disease vectors and their dynamics

#### (4) Implementing Structure for Research on the Communicable Diseases

There are four main laboratories for infectious diseases control besides KEMRI (see Table 5.5).

**Table 5.5 Research Institute for Communicable Diseases Control in Kenya**

Name of Institute	Outline of the Institute
International Centre of Insect Physiology and Ecology (ICIPE)	ICIPE has three missions: 1) to help ensure food security and better health for humankind and its livestock, 2) to protect the environment, and 3) to conserve and make better use of natural resources. To achieve its mission, ICIPE has specific objectives in research areas on human, animal, plant and environmental health.
Kenya Trypanosome Research Institute (KETRI)	KETRI was established at Kiboko in 1999 to conserve the unique gene pool by collecting and preserving semen for dissemination to willing farmers in tsetse infested and trypanosome endemic areas. KETRI carries out surveys in most parts of the Rift Valley, Central and Eastern Provinces that were initiated by KETRI and brought together officials from the Veterinary Department, the Kenya Wildlife Service, the affected communities and NGOs working in these areas among others. KETRI provides training and technical advice to project implementers, and the targets to be deployed in the Game Reserve to reduce tsetse infestation that was responsible for invasion of the surrounding areas. World Wildlife Fund (WWF) and the local district veterinary office pledged traps and will maintain targets/traps after deployment in the Game Reserve in collaboration with the community.
International Livestock Research Institute (ILRI)	ILRI is a non-profit institution governed by an international Board of Trustees and ILRI belongs to the Consultative Group on International Agricultural Research (CGIAR). The headquarters of ILRI are in Nairobi, and began operations in 1995 with the consolidation of staff and facilities of two former CGIAR livestock centres, the International Laboratory for Research on Animal Diseases (ILRAD) based in Nairobi, and the International Livestock Centre for Africa (ILCA) based in Addis Ababa, Ethiopia. ILRI works at the crossroads of livestock and poverty, bringing high-quality science and capacity-building to bear on poverty reduction and sustainable development for poor livestock keepers and their communities.
Institute of Primate Research (IPR)	IPR was established in 1960 with monkeys as models to understand human evolution and as a facility for the collection and study of East African primates. Since its inception, IPR has expanded tremendously in both physical and research facilities and is now focused on the breeding and use of non-human primates to study, prevent and treat human diseases under the auspices of animal welfare. IPR undertakes research into basic and applied aspects using monkeys. IPR is recognized as a WHO Collaborating Centre on human reproduction and tropical diseases research.

Prepared by the investigation team

KEMRI has been incorporated with other research centres such as the Kenya Tuberculosis Investigation Centre, the Malaria and Other Protozoal Diseases Centre, the Virus Research Centre, the Alupe Leprosy Research Centre, and the Medical Research Centre. As the main laboratories are already incorporated into KEMRI, there are no other laboratories having a duplicate role with KEMRI. KEMRI is recognized by the MOH as the largest medical research institute in Kenya, and it

conducts disease surveillance, produces diagnostic kits, such as HEPCELL II, provides diagnostic services for private companies, and information on outbreaks of infectious diseases as a WHO Collaborating Centre. Research institutes mentioned above, besides KETRI, target animals and plants and have no duplicate role with KEMRI.

### **5.2.3 Assistance for Communicable Diseases Control by Other Donors**

#### **(1) Type of Assistance**

Kenya introduced its PRSP in 1999 and it has continued to enact health care reforms as part of its regional decentralization policy, but most donors conduct bilateral cooperation, and it has not established a common fund based on a sector-wide approach (SWAps) as yet. Donor institutions established a Joint Interagency Coordination Committee (JICC) to cover the six areas of gender issues, HIV/AIDS, youth, monitoring and evaluation activities, public relations and emotional support in order to prevent assistance activities from being duplicated in these areas. Donor assistance in Kenya continues to follow this format.

#### **(2) Contents of the Support**

Based on the above, the cooperation mainly carried out in Kenya is bilateral, and many donor agencies have provided assistance for infectious diseases control, especially for malaria and HIV/AIDS. Duplication of assistance from donors has been avoided due to a system of information exchanges carried out through JICC. DFID and other Northern European agencies that have initiated SWAps in other African countries have restricted their technical assistance to strengthening regional decentralization and other policy measures.

Kenya is one of the four high priority countries identified by USAID to receive more resources for HIV/AIDS programming. USAID focuses on the prevention of HIV infection, policy and advocacy, community-based care and support, integration of AIDS with family planning and child health programs, blood safety, (operations research,) and multi-sectoral activities. In addition, President Bush's Emergency Plan for AIDS Relief (PEPFAR) is committed to funding of US\$15 billion over 5 years (2003-2008) for 15 focus countries, including Kenya.

Japan also has been collaborating with the USA for the development of the health sector in Kenya since 1997. As a part of the USAID-Japan Partnership, six projects for HIV/AIDS control, such as strengthening the VCT, and population / health censuses have been implemented, and also exchange staff were dispatched to the JICA Kenya Office.

The main activities of donors are shown in Table 5.6.

**Table 5.6 Main activities of Donors in 2003**

Donors	Main Activities
World Bank	EPI/NID and Infectious Disease Control Programme Maternal and Child Health Programme (MTCT of HIV/AIDS)
WHO	Health Reform Prevention and Care Programme Environment and Health Programme
UNICEF	EPI/NID and Infectious Diseases Control Programme Infant Health Programme Iodine Deficiency Disorder Control Programme Vitamin A Deficiency Control Programme PHC Programme
UNAIDS	National HIV/AIDS Control Programme
USAID	Health Reform National HIV/AIDS Control Programme Assistance to HIV/AIDS Control through PEPFER Supporting for VCT under the USAID-Japan Partnership programme.

Prepared by the investigation team

#### 5.2.4 Position and Roles of KEMRI in Communicable Diseases Control

The position of KEMRI in Infectious Diseases Control was not defined in the National Health Strategic Plan between 1999 and 2004, since KEMRI belonged to the MOH from September 1999 in line with the administrative reform of the GOK. The MOH is preparing the next National Health Strategic Plan, which is expected to be published in November 2004 at the time of the field survey. Thus, the evaluation team could not confirm the role and position of KEMRI in infectious diseases control in the official document. According to the MOH, infectious diseases control is one of the priority subjects of the next National Health Strategic Plan, and the MOH plans that KEMRI will continue to have an important role as a research institute for infectious diseases control as the largest research institute under the jurisdiction of the MOH.

Cooperation with international organizations such as WHO is one of characteristics of KEMRI in infectious diseases control. KEMRI has been appointed as a WHO Collaborating Centre for HIV/AIDS, Polio Immunization, Viral Haemorrhagic Fevers, Leprosy, Leishmaniasis, Anti-Microbial Resistance, and Bacteriology.

KEMRI is also recognized by CDC (USA) as a regional centre for Emerging and Re-emerging Infections. KEMRI is also Africa's regional centre for the International Union against TB and Lung Diseases, the International Union against Cancers, the Global Health Initiative on Climate Change and the Health and Drugs for neglected diseases Initiative (DNDI).

The positions held by KEMRI for control of the main infectious diseases are as follows. In addition, KEMRI also provides technical advice to the MOH and GHS through the dispatch of staff members to organise Rapid Response Teams for national preparedness in the event of major disease outbreaks.

#### (1) Malaria

As a research institute for Malaria, KEMRI has implemented epidemiological and clinical studies on malaria with the Wellcome Trust in the United Kingdom since

1989. KEMRI also has studied the development of a vaccine for malaria in cooperation with the Walter Reed Army Institute of Research (WRAIR) and USAID.

## (2) HIV/AIDS and STDs

KEMRI has been appointed a WHO Collaborating Centre on HIV/AIDS. KEMRI also developed and produced an HIV diagnostic kit with JICA, and conducts AIDS prevention and research in collaboration with the CDC.

## (3) Vector Borne Diseases

ESACIPAC, which was established in 2001 in collaboration with the MOH and MOE, was recognized as a training and research centre for parasitic diseases control through the school health system. ESACIPAC trains not only medical personnel in Kenya, but also in neighbouring countries.

As Kenya's foremost medical research centre under the jurisdiction of the MOH, KEMRI conducts comprehensive medical research in various fields, including infectious diseases. KEMRI conducts studies on the epidemiology, immunology, molecular biology, virology, bacteriology and prevention and control of 12 diseases, including HIV and related infections, opportunistic infections, etc. In addition, KEMRI contributes to the management of the African Forum for Health Science as a major research institute in Africa and also contributes to publication of the African Journal of Health Science.

As a training institute, KEMRI also contributes to human resources development in the medical sector through the provision of laboratory training for medical students and vocational medical school students, and lectures to postgraduate students at the Institute of Tropical Medicine and Infectious Diseases. In addition, training in diagnostic technology for medical personnel is carried out as well as the organization of medical conferences and meetings in the African region.

In the area of health services, KEMRI conducts surveillance for various diseases, provides the MOH with technical advice, produces HEPCELL II and other diagnostic kits, provides testing and diagnostic services for private companies, and disseminates the most recent information on each type of disease, both domestically and abroad, as a WHO Collaborating Centre. KEMRI also conducts studies for national preparedness in the event of major disease outbreaks based on a request from the MOH. Table 5.7 shows the studies that KEMRI participated in.

**Table 5.7 Rapid Response Teams dispatched by KEMRI**

Year	Area	Diseases outbreak
1995	Marakwat District and Elgeyo District	Yellow Fever
1998	North East Province	Rift Valley Fever
2004	Western Kenya	Leptospirosis jaundice

Prepared by the investigation team

The roles of KEMRI in infectious diseases control mentioned above are summarized in Table 5.8.

**Table 5.8 Main Roles of KEMRI in Communicable Diseases Control**

Main Roles	Activities
Research	Studies on the epidemiology, immunology, molecular biology, virology, bacteriology and prevention and control of HIV and related infections, opportunistic infections, TB, STDs, viral hepatitis, ARI, diarrhoeal diseases, malaria, Schistosomiasis, Leishmaniasis, Filariasis, intestinal parasites, drug development and management. Support for the management of the African Forum for Health Science and the publication of the African Journal of Health Science
Human Resources Development	Training and education for medical personnel, undergraduate and postgraduate students. Holding medical congresses
Contribution to Health Services	Dissemination of disease information as a WHO reference laboratory, conducting surveillance, technical advice to the MOH, production of diagnostic kits, and the provision of diagnostic services for private companies.

Prepared by the investigation team

As shown in Table 5.9, 9 research areas out of the 12 mentioned above are covered by JICA cooperation.

**Table 5.9 Target Diseases of JICA Projects**

Targets Diseases of JICA Projects	Non Target Diseases
Viral Hepatitis	Malaria
HIV/AIDS	TB
Opportunistic Infections	STDs
Diarrhoeal diseases	Leishmaniasis
ARI	Intestinal parasites
Schistosomiasis	
Filariasis	

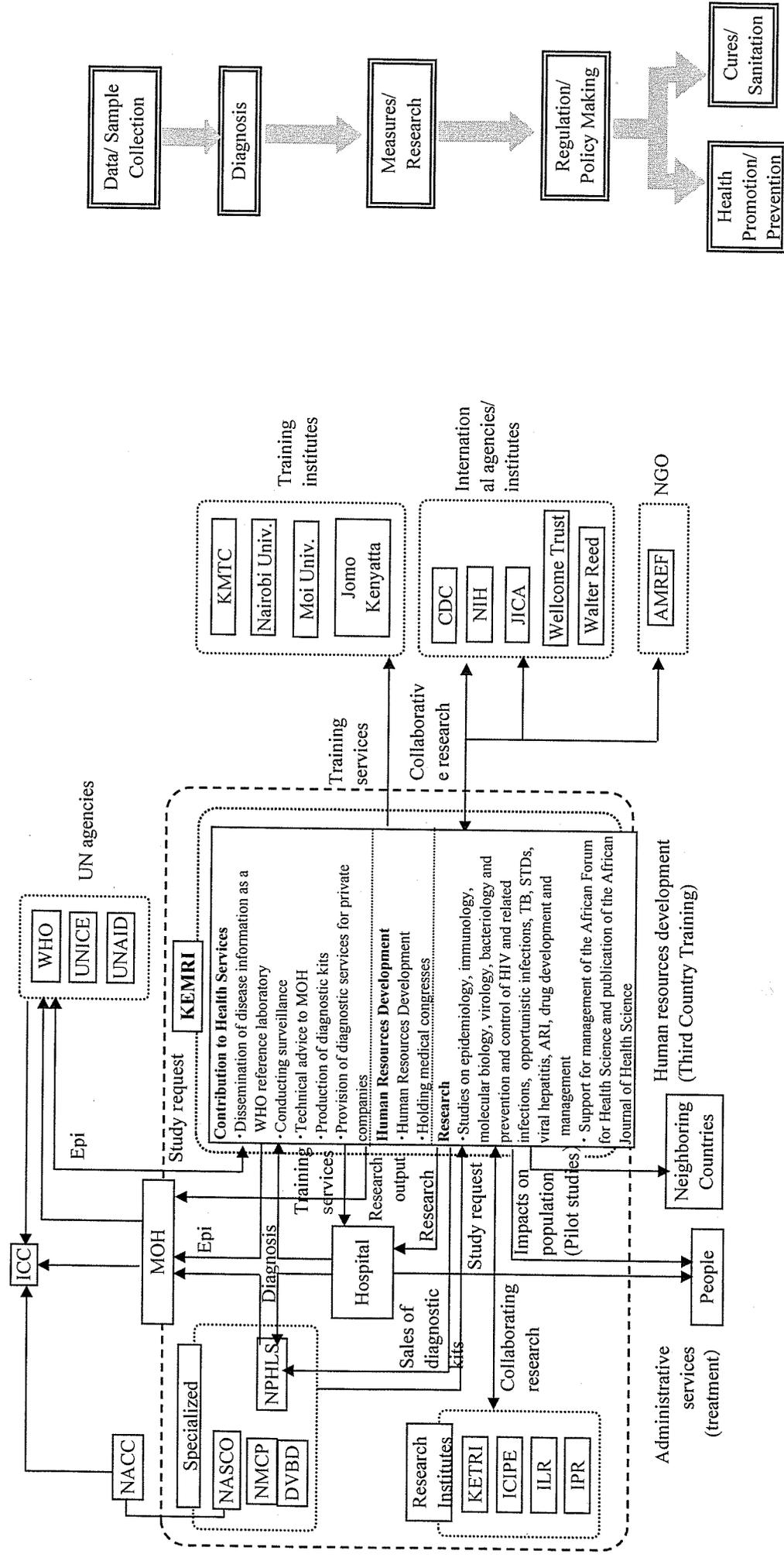
Prepared by the investigation team

### **5.2.5 Relationship between KEMRI and Other Organizations Involved in Communicable Diseases Control**

The MOH is responsible for implementing infectious diseases control in Kenya. PPHS collects the necessary information and data to implement infectious diseases control through the consignment of surveys and research to affiliated research institutes of the MOH, such as KEMRI and NPHLS. Using this data, programmes for infectious diseases control are prepared by each unit and disseminated to hospitals and health facilities. In event of an outbreak of an infectious disease in rural areas, rural hospitals send information to NPHRL, and NPHRL retests specimens from the rural hospitals, if necessary. If it is difficult for NPHRL to obtain a diagnosis, KEMRI will be requested to identify and diagnose the specimens. The epidemiological data that is obtained is disseminated to the MOH and the WHO.

The relationship between KEMRI and other organizations involved in infectious diseases control in Kenya is shown on Figure 5.5.

Figure 5.4 Relationship of the KEMRI to Other Organizations related to Infectious Diseases Control



Prepared by the investigation team

### **5.3 KEMRI's Contribution to Communicable Diseases Control Based on Cooperation Provided by JICA**

KEMRI has largely developed its research infrastructure and research capacity in cooperation with JICA. Collaborative research with foreign institutes was activated simultaneously with the capacity development of KEMRI. KEMRI is now ranked as one of the top research institutes in Africa.

KEMRI has contributed to improving infectious diseases control in Kenya through the dissemination of research outputs among medical personnel or reflecting research outputs the health services of the GOK.

The research outputs that contributed to human resources development or health services are summarized below by the diseases.

#### **5.3.1 Contribution to Each Disease**

##### **(1) Hepatitis B**

Research and development of hepatitis B diagnostic kits were carried out from the initial stages of JICA's cooperation. During the approximately 20-year period of cooperation, a series of activities were conducted to disseminate the kits throughout the country, including the further development of the diagnostic kits, the establishment of a mass production system, and the introduction of a freeze-dried method for improving storage of the kits. As a result, the screening rate of blood for transfusions was increased from 45% to 95%. The development of HEPCELL II was one of the greatest achievements of JICA's cooperation.

The contributions made by JICA's cooperation in relation to hepatitis B are summarized as follows.

##### **1) Dissemination of HEPCELL II to Medical Personnel**

As mentioned above, HEPCELL II was approved as the official test kit for Hepatitis B by the GOK in 1992. Since 1991, in advance of this approval, KEMRI held an In-Country Training Programme (ICTP) for diagnostic methods for Hepatitis B for technicians and technologists at the provincial and district levels. Participants were also trained in the utilization methods of HEPCELL II in this ICTP. There were 194 technicians and technologists trained through this ICTP between 1991 and 2003 (see Table 5.10).

**Table 5.10 Number of Trainees in ICTPs for Blood Safety (Hepatitis B)**

Year	No. of trainees	Target
1991	16	8 PHs
1992	16	- ditto -
1993	16	- ditto -
1994	8	- ditto -
1995	-	
1996	-	
1997	23	8 PHs
1998	26	DHs in Coast province.
1999	29	DHs in Nyanza province.
2000	43	DHs in Western province.*
2001	40	DHs in Rift Valley province.
2002	20	DHs in Central province.
2003	13	DHs in Eastern / North Eastern province.
Total	194	

Note: PH Provincial hospital, DH District hospital

\* Training sessions in 2000 were held 2 times at Kisumu and Kakamega.

Prepared by the investigation team

After the closing of the training courses, KEMRI conducted a follow-up survey of the hospitals in order to monitor and analyse the problems of HEPCELL usage, and conduct an evaluation of the test system, advice and retraining of staff on-site, and data collection. The provincial and district hospitals acquired the utilization techniques of HEPCELL II and the ability to conduct proper blood screening using HEPCELL II through the activities of the ICTPs.

KEMRI also held a Third Country Training Programme (TCTP) for blood screening (hepatitis B and HIV/AIDS). There were 62 participants from 17 countries trained in the blood screening courses (see Table 5.11).

**Table 5.11 Number of Participants in the TCTP on Blood Screening for Viral Hepatitis and HIV/AIDS**

Countries	Unit: Person				
	1999	2000	2001	2003	Total
Ethiopia	2	-	-	3	5
Tanzania	2	2	1	2	7
Ghana	2	-	-	2	4
Zambia	3	-	-	2	5
Kenya	2	2	2	2	8
Uganda	3	2	1	3	9
Zimbabwe	-	2	-	-	2
Malawi	-	2	-	-	2
Eritrea	-	2	-	-	2
Botswana	-	2	-	-	2
Swaziland	-	2	-	-	2
Mauritius	-	-	2	-	2
Lesotho	-	-	2	-	2
Namibia	-	-	2	-	2
Seychelles	-	-	2	2	4
Nigeria	-	-	2	-	2
South Africa	-	-	2	-	2
<b>Total</b>	<b>14</b>	<b>16</b>	<b>16</b>	<b>16</b>	<b>62</b>

Source: Reachout Consultancies Ltd.(2002), Evaluation Report on the Third Country Training Programme (TCTP) on Blood Screening for HIV/AIDS and Viral Hepatitis at the Kenya Medical Research Institute (KEMRI) Final Report

KEMRI conducted questionnaire surveys of the participants to improve the training courses. Part of the survey that related to the contents of the courses and the management capacity of KEMRI are summarized in Table 5.12. The answers to the questionnaire surveys in Table 5.12 include answers from the trainees on HIV/AIDS courses mentioned later. In addition, the results of the questionnaire survey in 2003 is not included in this summary due to the use of a different questionnaire in 2003.

The majority of the participants were satisfied with the level and contents of the courses, and also satisfied with the training facilities in KEMRI. All of them were confident of utilizing the techniques learned in the courses.

**Table 5.12 Satisfaction Level of the Participants in the Safety Blood Training Course for Viral Hepatitis and HIV/AIDS**

Unit: person

Question	Strongly Disagree	Disagree	Neither Disagree nor Agree	Agree	Strongly Agree	Total
The course lived up to my expectations and met the stated objectives	1	1	2	28	11	43
The content is relevant to my job.				27	17	44
The objectives were clear to me			1	24	17	42
The activities stimulated my learning.				24	18	42
The activities in this session gave me sufficient practice and feedback			6	24	14	44
The level of this session is appropriate	1	3	8	16	6	34
The pace is appropriate	2	4	4	17	14	41
The training facility at this site was comfortable for learning.				18	10	28
The training facility provided most of what I needed to learn.			2	16	11	29
I accomplished the objectives of this course.		1	2	24	15	42
I will be able to use what I learned in this course.				27	17	44

Note: Parts of the questionnaire survey from 1999 to 2001 were summarized.

Sources: Reachout Consultancies Ltd.(2002), Evaluation Report on the Third Country Training Programme (TCTP) on Blood Screening for HIV/AIDS and Viral Hepatitis at the Kenya Medical Research Institute (KEMRI) Final Report

Besides the above questionnaire survey by KEMRI, JICA also conducted an ex-post evaluation targeting the participants of courses in 2000 and 2001. This ex-post evaluation collected the information from not only participants, but also their supervisors. The supervisors also recognized changes in the performance of the participants (see Table 5.13). Thus, it is judged that KEMRI contributed to improving diagnostic capacity in neighbouring countries.

**Table 5.13 Changes in the Performance of TCTP Participants after Training**

Unit: person

Indicator Task Variable	Change in knowledge and skills		
	Yes	No	Uncertain
Knowledge of blood safety	7		2
Setting up blood screening tests	7		2
Interpreting test results	7		2
Reporting test results	7		3
Recording test results	6	1	2
Quality control of tests	6	1	2
Productivity	6	1	2
Morale	6		3

Sources: Reachout Consultancies Ltd.(2002), Evaluation Report on the Third Country Training Programme on Blood Screening for HIV/AIDS and Viral Hepatitis at the Kenya Medical Research Institute

## 2) Increasing the Screening Rate of Blood for Transfusions

HEPCELL II, a diagnostic kit for Hepatitis B developed by KEMRI, has been distributed to provincial hospitals and blood banks through NPHLS since 2002. There were 400 kits and 1,000 kits distributed in 2002 and 2003, respectively.

As mentioned previously, medicines and reagents distributed by NPHRS are purchased through tender. HEPCELL II has an advantage over competing diagnostic kits from the financial aspects, although the results of the tender for 2004 were not announced during the period of the field survey (see Table 5.14).

**Table 5.14 Market Prices for Diagnostic Kits for Hepatitis B**

Name of diagnostic kit	Unit price/test (Kshs)
HEPCELL II	50
Celia-Hep B	130
CDI	100
Nerugost	140
Rialab	160
Eurotec	70
ELISA	100

Note: 1 US Dollar = 79.75 Kenyan Shilling (as of July 2004)

Prepared by the investigation team

Besides the financial aspect, HEPCELL has the following advantages:

- Technicians and technologists in the provincial and district hospitals have acquired skills in the use of HEPCELL II through training by KEMRI.
- KEMRI is able to quickly deal with and respond to questions from the users.
- KEMRI is able to establish a sustainable supply system due to its own production within the country.
- Simple operation and does not require electricity; furthermore, no additional apparatus is required.

NPHLS could not provide a sufficient number of diagnostic kits for Hepatitis B before they adopted HEPCELL as the official diagnostic kit. According to NPHLS, the adoption of the most inexpensive kit, HEPCELL II, enabled NPHLS to supply diagnostic kits to most of the district hospitals. As a result, the screening rate of blood for transfusions increased from 45% to 95%.

## (2) HIV/AIDS

In addition to hepatitis B, research and development on HIV test kits has also been a major activity of JICA's cooperation. Although test kits that met basic WHO standards had not been developed in July 2004, JICA's cooperation contributed to HIV/AIDS control through the dissemination of diagnostic methods, research on PMTCT and the introduction of new technology as follows:

## 1) Dissemination of Diagnostic Methods for HIV

KEMRI held training courses for HIV/AIDS diagnosis as a part of an ICTP for technicians and technologists at the provincial and district levels. Lectures on HIV tests and practical training using PA kits developed by KEMRI were conducted during the course. There have been 122 technicians and technologists trained through the ICTP between 1997 and 2004 (see Table 5.15).

**Table 5.15 ICTP for Blood Safety**

	No. of trainees	Target
1997	8	8 PHs
1998		
1999		
2000	24	DHs in Western Province
2001	18	DHs in Central Province
2002	22	DHs in Coast Province
2003	20	DHs in Nairobi province
2004	30	DHs in Rift Valley Province
Total	122	

Note: PH Provincial hospital, DH District hospital

\* Training sessions for Hepatitis were held two times at Kisumu and Kakamega in 2000.

Sources: Reachout Consultancies Ltd.(2002), Evaluation Report on the Third Country Training Programme (TCTP) on Blood Screening for HIV/AIDS and Viral Hepatitis at the Kenya Medical Research Institute (KEMRI) Final Report

As well as the ICTP for Hepatitis B, KEMRI conducted a follow-up survey at hospitals in order to monitor and analyse the problems of PA usage, and conducted an evaluation of the test system, the advice and retraining of staff on-site, and data collection. The provincial and district hospitals acquired techniques for the utilization of PA and the ability to conduct proper blood screening using PA through the activities under the ICTP. Although PA cannot be utilised in hospitals since it reacts to the HIV-1 strain only, KEMRI contributed to improving the diagnostic capacity of public hospitals through the ICTP.

The TCTP for blood screening, which is described in the section on Hepatitis B included training in HIV/AIDS diagnostic techniques (detailed information is given in 4.3.1 (1) 1) b.).

As mentioned in the section on the TCTP for Hepatitis B, the majority of the participants were satisfied with the level and contents of the courses, and also satisfied with the training facilities at KEMRI. All of them were confident of utilizing the techniques learned in the courses.

In addition, according to the ex-post evaluation conducted by JICA in 2000 and 2001 mentioned above, the supervisors of the participants also recognized positive changes in the performance of the participants. Thus, KEMRI contributed to improving the diagnostic capacity for HIV in neighbouring countries.

## 2) Contribution to PMTCT

The efficacy of short-course Zidovudine for the prevention of mother to child transmission (PMTCT) of HIV was confirmed by KEMRI in cooperation with JICA. As a result, it was confirmed that the transmission rate has decreased by more than

60% by dosing HIV infected pregnant women with Zidovudine. Based on this result, Zidovudine was adopted by earlier national intervention programmes as an anti-retrovirus drug.

### **3) Introduction of New Diagnostic Methods**

KEMRI was the first institute to introduce CD4/CD8 counting and viral load for monitoring the progress of HIV-infected patients through JICA's cooperation. KEMRI took part in the technical training when the MOH introduced the equipment for these diagnostic methods.

### **(3) Schistosomiasis**

The health condition of people in two villages in the Kuware district was improved as a result of the pilot project for verifying the effectiveness of intensive treatment (consisting of mass-chemotherapy, safe water supply, control of vector snails, and health education) for Schistosomiasis control. Some of the project activities have been handed over to an NGO, and safe water has been supplied to the village. In addition, the urine ELISA method was developed and utilized in the field studies for schistosomiasis research. However, this method was not disseminated to the MOH and other institutes due to cost issues.

The integrated intervention methods for Schistosomiasis control were applied, such as mass-chemotherapy, safe water supply, environmental modification (control of the vector snails through cleaning plans for the rivers) and health education in the period 1982 - 1993. As a result, there was a significant decrease in the haematuria rate (indicator for the symptoms of Schistosomiasis) confirmed during the pilot studies, although a significant change in the prevalence rate was not observed. The prevalence rate fluctuated between 20 and 47% in Mwachinga, and 18 to around 48% in Mtsangatamu, during the period of the pilot study.

Research conducted in cooperation with JICA ended in 1996. However, a Nagasaki University professor who was originally dispatched as a JICA expert under this project has continued his research into parasitic control using both of these two villages as part of a university study after the JICA programme ended. Moreover, a clinic has been voluntarily set up in Mwachinga village by the Nagasaki University professor, which is being effectively utilized by the villagers.

In Musangatam village, Plan International, an NGO, created a new water supply facility using the water resources developed by KEMRI, and it has continued to provide assistance to ensure that the villagers have access to safe water.

Facilities developed under the pilot project are no longer in use, but due to the activities of Nagasaki University and the NGO, the activities for parasite control continue to be carried out in both villages. Table 5.16 shows the facilities or inputs through JICA's cooperation and their current state.

**Table 5.16 Current State of Facilities Provided**

Facilities	Present situation
Mwachinga village	
Shower rooms	Under the conditions in which children swim in the river, shower rooms were established for children at a primary school. Since the schools have a budget for water fees from the government, this facility has been used and maintained.
Water taps	There were five water taps installed through the pilot study. However, none of the water taps were being used due to a malfunction of the fee collection system. However, recently, one water tap has started operation.
Mtsangatamu village	
Pool and washing place on the outskirts of the village	A pool and washing place were built to avoid swimming in the river. These facilities were well utilized during the period of the pilot study. However, these facilities have not been used since the NGOs established more convenient facilities at the centres of villages in 1996. The appearance of elephants around the facilities was also leading to neglect of the facilities.

Prepared by the investigation team

It was observed that, in these pilot studies a major contribution was made by the villagers in relation to their knowledge about the disease, its prevention and the control measures. The villagers became aware of the dangers of parasitic infections through the pilot project. KEMRI estimated that more than 90% of the village inhabitants improved their knowledge and attitude towards parasite control, and changed their utilization of the river water.

#### **(4) JICA's Cooperation in KEMRI**

As mentioned earlier, JICA has supported various kinds of research activities for infectious diseases. The research capacity of KEMRI established through technical cooperation provided by JICA has been utilized or applied for the implementation of surveillance and reference services. Diagnostic techniques transferred by JICA through training have been disseminated to medical personnel within and outside the country.

The diseases targeted by JICA cooperation are listed in Table 5.17.

**Table 5.17 JICA's Cooperation in KEMRI**

Target diseases	Research	Human Resources Development	Contribution to Health Services			
			Surveillance	Reference	Direct Contribution to the Population	Diagnostic kit Development
Viral Hepatitis	○	○	○	—	○	○
HIV/AIDS	○	○	○	—	—	○
Opportunistic Infections	○	—	—	—	—	—
Diarrhoeal diseases	○	—	—	—	—	—
ARI	○	—	—	—	—	—
Schistosomiasis	○	—	—	—	○	—
Filariasis	○	—	—	—	—	—

Prepared by the investigation team

All 12 diseases mentioned in Table 5.16 are infectious diseases, and JICA has cooperated in research activities for 7 of these diseases. It was confirmed that KEMRI conducted activities in human resources development and the improvement of health services for 3 diseases out of 9. Research on viral hepatitis and HIV/AIDS in particular had achieved significant outputs through the development of diagnostic kits.

### 5.3.2 Achievements of JICA's Cooperation

As mentioned in Section 5.3.1, KEMRI has contributed to infectious diseases control through cooperation with JICA. JICA contributed not only to disease control, but also to the capacity development of KEMRI. The achievements of JICA's cooperation in the capacity development of KEMRI are as follows.

#### (1) Capacity Development of KEMRI

As mentioned in Section 5.1.3, it is assumed that technical cooperation provided by JICA since 1979 aimed to strengthen the research capacity of KEMRI, and also strengthened the capacity of medical personnel engaged in infectious diseases control through training.

Besides the JICA projects, KEMRI has conducted collaborative research with the CDC and the Walter Reed Army Institute of Research since its establishment. KEMRI improved its research capacity based on the support provided by JICA and other foreign institutes, and activated collaborative research. A case example of such collaborative research carried out by KEMRI and foreign research institutes is shown in Table 5.18.

**Table 5.18 Case Example of Collaborative Research by KEMRI**

Overseas Research Institutes	Research Content
Centres for Disease Control and Prevention (CDC)	CDC conducts AIDS prevention and research at Kisumu in West Kenya in collaboration with KEMRI. The Kisumu centre, which has 200 staff members assigned from KEMRI is the largest CDC group outside the United States.
Walter Reed Army Institute of Research (WRAIR)	WRAIR conducts studies on the development of vaccines for malaria in cooperation with USAID and KEMRI.
Wellcome Trust	The Wellcome Trust has conducted epidemiological and clinical studies on malaria in Kilifi since 1989. Kirifi is the largest site of KEMRI, and has 600 staff members.

Prepared by the investigation team

The Kisumu centre is the largest CDC group outside the United States. Both the CDC and WRAIR have established their research base at the Kimusu centre, and intend to continue research activities with KEMRI in the future. In addition, the Wellcome Trust in Kilifi also intends to conduct research on malaria.

KEMRI has a sophisticated research capacity and infrastructure for conducting collaborative research, and also plans to continue collaborative research.

Researchers from KEMRI have high academic degrees, and most of them have the title of doctor, PhD, or the minimum of a Masters degree with research experience. The research outputs of these researchers have been published in internal/external journals (see Table 5.19).

**Table 5.19 Number of Publications**

	1991-93	1994-95	1996	1998	1999	2000	2001
No. of articles	200	156	32	49	61	81	48

Source: KEMRI (2002), Annual Report and Statement of Account

Although it fluctuates every year, KEMRI has published more than 50 articles per year, and it seems that KEMRI has conducted research at a high technological level.

The research projects of KEMRI are categorized into four groups, namely 1) Biotechnology and Non-Infectious Diseases, 2) Infectious Diseases, 3) Epidemiology, Health Systems and Public Health, 4) Parasitic Diseases. It seems that KEMRI focuses on research in the field of Infectious Diseases and Parasitic Diseases, since more than 80% of the research projects implemented between 1998 and 2003 were categorized into Infectious Diseases or Parasitic Diseases. In addition, about 60% of the publications during this period were also in the field of Infectious Diseases and Parasitic Diseases (see Table 5.20).

**Table 5.20 Number of Projects and Publications (1998-2003)**

	No. of projects approved	No. of projects funded	No. of Publications
Biotechnology and Non-Infectious Diseases	19	18	48
Infectious Diseases	98	92	57
Epidemiology, Health Systems and Public Health	19	12	22
Parasitic Diseases	68	65	55
Total	204	187	182

Sources : KEMRI (1999), About KEMRI et al.

KEMRI has been appointed as a WHO Collaborating Centre, and is also recognized by the CDC as a regional centre for Emerging and Re-emerging Infections, and as Africa's regional centre for international organizations. Thus, KEMRI is recognized for its research capacity by international organizations.

As a leading institute in Africa, KEMRI contributed to the establishment of the African Forum for Health Science which undertakes two activities towards the promotion of health research in Africa, the organization of the African Health Congress and the publication of the African Journal of Health Science. The Director of KEMRI is appointed as the editor in chief of the African Journal of Health Science.

As mentioned above, KEMRI has continuously conducted research on infectious diseases control, and its research capacity is highly regarded by foreign research institutes. Thus, it is considered that the objectives of JICA cooperation and the strengthening of the research capacity of KEMRI have been achieved to a large extent.

## **(2) Infrastructure Development**

Japan's contribution towards capacity building at KEMRI is not only concerned with technology transfer, but also infrastructure development. The main buildings of the KEMRI Headquarters and a large quantity of equipment were procured through Japanese assistance. KEMRI has evaluated that this advanced infrastructure and equipment enabled KEMRI to implement collaborative research activities with foreign institutes. These collaborative research activities with other foreign institutes have also improved the research capacity of KEMRI.

The case of JICA's cooperation with KEMRI is one of the successful examples of the synergistic effects that JICA's technical cooperation has achieved through a well utilized research infrastructure that was developed with Japanese grant aid, and this infrastructure and the transferred technology has enabled the institute to carry out collaborative research with other foreign institutes.

## **(3) Strengthening the Capacity for Research Implementation**

As mentioned earlier, KEMRI had acquired the capacity to conduct research that has enabled it to expand collaborative research with foreign institutes through the transfer of technology and infrastructure development provided by Japan. This capacity also enables KEMRI to continuously obtain research grants from foreign institutes as well as to strengthen its financial base.

The budgetary sources of KEMRI consist of the MOH grants (budget from the GOK) for recurrent expenditures (personnel costs, lighting and heating expenses, etc.), research grants from foreign institutes, and earnings from income-generating activities. Some of the recurrent expenditures are allocated to each centre as an operational budget (fuel costs, costs for consumable items). According to the directors of each centre, they earned 5 to 10% of their operational budget through income-generating activities, although this amount is not mentioned in the balance sheet.

The MOH grants have continuously increased since 1999/2000, and reached 545 million Kshs in 2002/03 and 852 million in 2003/04.

Development expenditures that consist of “special accounts and grants” and “JICA operational grants” also increased due to the rapid increase in “special accounts and grants”. Thus, the share of JICA operational grants in the development expenditures declined from 11% in 1998/99 to 5% in 2002/03 (see Table 4.21).

**Table 5.21 Income and Expenditure Account of KEMRI**

	Unit: 1,000 Kshs				
	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
<b>Income</b>					
MOH Grants	297,769	282,737	382,934	478,694	544,923
Special Accounts and Grants	99,665	228,555	238,132	330,001	589,533
JICA Operational Grants	12,386	18,471	12,026	15,657	31,952
<b>Total</b>	<b>409,820</b>	<b>529,763</b>	<b>633,092</b>	<b>824,352</b>	<b>1,166,408</b>
<b>Expenditure</b>					
		406,330	534,443	632,387	817,579

Note: 1 US Dollar = 76.35 Kenyan Shilling (as of December 2003)

Source: KEMRI (2002), Annual Report and Statement of Accounts et al.

As Table 5.22 shows, over 50% of the research grants from overseas come from US institutes, such as the CDC and Walter Reed Army Institute of Research.

**Table 5.22 Details of the Special Accounts and Grants**

Unit: 1,000 Kshs

	1998/1999	1999/2000	2000/2001	2001/2002	2002/2003
US Embassy-USAMRU Project	25,437	49,891	80,048	132,752	245,468
US, Embassy CDC Project	28,280	56,122	46,953	110,712	226,889
US Government Treasury Others	473	14,087	20,610	6,810	3,068
Wellcome Trust Research Laboratory	n.a.	n.a.	n.a.	3,560	2,812
US, Embassy Others					271
Case Western Reserve University	1,527	3,488	3,490	4,865	6,481
Commonwealth Secretariat	1,591	269	404	415	85
World Health Organization	17,555	32,594	23,393	21,959	32,277
Carnegie Corporation	748	26			
UNICEF	3,908	4,887	549	730	669
Royal Tropical Institute	2,598	9,086	4,631	1,399	86
University of New Mexico	365	3,661	6,352	6,007	3,739
African Medical Services Trust		4,704	2,225	91	
SmithKline Pharm Institute			5,788	5,684	3,222
Glaxo SmithKline		3,294			
University of Otago			2,537	419	34
Oxford University			2,139	23	75
Liverpool School of Tropical Medicine			847	3,059	4,257
INSERM Institute National			381	1,396	1,306
New York State University					8,467
University of Washington					2,511
Miscellaneous sources	17,186	46,446	37,784	30,119	47,814

Note: 1 US Dollar = 76.35 Kenyan Shilling (as of December 2003)

Source: KEMRI (2002), Annual Report and Statement of Accounts et al.

KEMRI relies on grants from foreign donors for its development expenditures, and it seems that the expansion of the collaborative research was enabled through the research infrastructure of KEMRI developed by Japan. Japanese cooperation with KEMRI has contributed to strengthening its research capacity as well as its financial sustainability.

#### **(4) Strengthening the Relationship with the MOH**

KEMRI has conducted various types of research contributing to infectious diseases control. However, much of this research did not include consideration of the financial feasibility of reflecting the research outputs in the actual practice of disease control and cooperation with the implementation systems for infectious diseases control. For instance, the pilot project for parasite control in Kwale was not reflected in the activities of the MOH due to a lack of consideration for the relationship with the MOH, even though the health condition of the villagers was improved by the project activities.

As mentioned in Table 5.23, the responsible Ministry for KEMRI changed several times due to the reform of the government structure. KEMRI explained that it had heard that their research outputs on infectious diseases control produced during the period 1983 – 1999 was when KEMRI belonged to ministries that did not have responsibility for the health sector. This was also pointed out by reports of JICA projects.

**Table 5.23 Changes in the Ministry Responsible for KEMRI**

Ministry Responsible for KEMRI	
1979~1983	MOH
1983~1985	Ministry of Regional Development Science and Technology (MRDST)
1985~1999	Ministry of Research, Technical Training and Technology (MRTTT)
1999~	MOH

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KEMRI became an affiliated research institute of the MOH in 1999, due to the reorganization of the government structure. A smooth relationship has been established between KEMRI and MOH through the appointment of representatives of the MOH as members of all committees in KEMRI following this shift.

### **(5) Reform of JICA Schemes**

Many of the participants from KEMRI pointed out that JICA did not have any system for counterparts to acquire an academic background. This constraint has been discussed between KEMRI and JICA since the beginning of JICA's cooperation.

In KEMRI, the promotion of staff largely depends on their academic background. For instance, it is necessary to at least have a Masters degree to become a research officer, and a Doctoral degree for a senior research officer. Therefore, support for participants from KEMRI to pursue a higher educational degree is included in collaborative projects with other foreign institutes.

Thus, the lack of support for proceeding to a higher educational degree in JICA's cooperation has influenced the willingness of researchers in KEMRI to participate in JICA projects. However, JICA has tried to resolve this problem through the recent introduction of a support system for pursuing educational degrees by counterparts.

### **5.3.3 Conclusions**

JICA has implemented cooperation with the expectation that health services will be improved through the effect of KEMRI's functioning as a base for research and diagnosis on infectious diseases control as well as a base for the human resources development.

JICA's cooperation with KEMRI is characterized by activities that concentrate on two main functions - blood screening and parasite control. Blood screening activities, in particular, enabled the test kits developed by KEMRI to be disseminated nationwide through coordinated research and training activities. In addition, as a research institute and a WHO Collaborating Centre, KEMRI has greatly contributed to infectious diseases control in other parts of Africa as well serving as a regional educational and training institute.

As in the case of NMIMR in Ghana, KEMRI contributed to improvements in the health condition of the population through the improvement of health services that reflected its research outputs. As expected by JICA, KEMRI contributed to improving infectious diseases control in Kenya, and the foundations for this research were built through JICA's cooperation. As with NMIMR, KEMRI has also acquired sufficient capacity as a research institute. In view of the fact that the cooperation

between JICA and KEMRI is proceeding to next stage, JICA should consider the validity of the cooperation that has the aim of technology transfer. It is, therefore, required to establish a new cooperation scheme for KEMRI with activities consisting mainly of collaborative research with foreign institutes.

#### **5.4 Expected Roles of the KEMRI**

KEMRI has contributed to improving infectious diseases control in Kenya and in the surrounding countries. The expected roles of KEMRI for making a further contribution to infectious diseases control are summarized from the viewpoint of research, human resources development and the contribution to health services as follows:

##### **(1) Research**

Japan has continuously provided cooperation to KEMRI since its establishment through the implementation of project type technical cooperation and grant aid projects. As a result, KEMRI has become the foremost medical research institute in Africa and it conducts collaborative research with the CDC, WRAIR and Wellcome Trust. KEMRI is, therefore, recognized as one of the global strongholds for infectious diseases control.

As mentioned above, JICA's cooperation is characterised by its focus on the continuous development of blood test kits. The development of inexpensive test kits has contributed to increasing the screening rate of blood for transfusions. KEMRI is developing several test kits, including ones for HIV/AIDS. It is expected that KEMRI will continuously conduct research for the development of these test kits.

The research subjects of KEMRI extend to the entire medical sector covering infectious diseases control. These research outputs are applied to infectious diseases control by the MOH and its research partners. In addition, research outputs are published in medical journals and utilised internationally for improving infectious diseases control. Moreover, KEMRI contributes academically to the development of medical personnel in Africa through the management of AFHES, which is the foremost medical forum in Africa and publishes the African Journal of Health Science.

As a stronghold of infectious diseases control, it is expected that KEMRI will continue to contribute to the diffusion of research outputs in the African region through periodic or continuous research activities, such as the development of original disease control methods based on regional characteristics, the development of blood test kits, and other research related to infectious diseases in Africa, and providing support for the AFHES and the African Journal of Health Science.

##### **(2) Human Resources Development**

KEMRI has contributed to human resources development in the medical sector through the implementation of ICTP, TCTP, and the acceptance of postgraduate students from universities in Kenya, and training for postgraduate students from the Institute of Tropical Medicine and Infectious Diseases. In particular, ICTP for blood

screening contributed to an increase in the screening rate of blood for transfusion through the spread of HEPCELL II, a test kit for Hepatitis B developed by KEMRI.

Moreover, collaboration research by KEMRI also contributed to human resources development in the medical sector as a training place for foreign researchers. In addition, through the support to the AFHES and the African Journal of Health Science, KEMRI conducts human resources development in the medical sector in the African region. It is expected that KEMRI will take leadership in the medical sector in the African region, and conduct training related to development research and contribute directly to the health services.

### **(3) KEMRI's Contribution to the Health Services**

Since the research institute was placed under the jurisdiction of the MOH in 1999, KEMRI and the MOH have strengthened their relationship. The institute's research findings are submitted to the MOH and have helped improve health services. In particular, the development and production of HEPCELL II and its dissemination through the ICTP have improved the screening rate of blood for transfusions from 45% to 95%.

In addition, KEMRI contributed to the improvement of the health services by providing surveillance services and reference services. As part of the surveillance services, KEMRI dispatches rapid response teams to outbreaks of infectious diseases, and provides diagnostic services to private companies. KEMRI also provides reference service as a regional WHO Collaborating Centre.

Although KEMRI does not have the role of implementing national diseases control and other testing, KEMRI has the additional role of producing test kits, which was not included in the original mandate of the research institute. The Japanese government plans to support the development of a production facility for test kits under KEMRI. Thus, KEMRI will have a new role of producing and selling test kits.

It is expected that the research activities that directly link infectious diseases control and the implementation of disease surveillance will increase to improve the health services in Kenya through the adoption of the research outputs of KEMRI by health services. It is also important to strengthen the reference services such as the establishment and expansion of epidemiological databases for HIV/AIDS and emerging/re-emerging infectious diseases, and enhancing information services.

The expected roles of KEMRI in relation to infectious diseases control in Kenya are summarized in Table 5.24.

**Table 5.24 Expected Roles of KEMRI in Communicable Diseases Control**

Areas	Roles
Research	<ul style="list-style-type: none"><li>➤ Research targets are viral, bacterial and parasitic infectious diseases</li><li>➤ Epidemiological surveys and studies</li><li>➤ Improving diagnostic methods in classical and modern technology, such as isolation and identification through basic techniques, and molecular level and generic analysis in a P-3 bio-safety laboratory using advanced technology</li><li>➤ Clinical trials in vitro and in vivo, such as drug resistance and sensitivity</li><li>➤ Evaluation of research and study results or outcomes</li><li>➤ Collaborative studies with other institutes, universities and hospitals within the country or overseas.</li></ul>
Human resources development	<ul style="list-style-type: none"><li>➤ Laboratory practice for students of medical schools, faculties of science and medical vocational schools</li><li>➤ Re-training of diagnostic techniques for medical workers.</li><li>➤ Technical transfer of diagnostic experimental methods and QC to researchers</li><li>➤ Collaborative research with institutes and universities within the country or overseas</li><li>➤ Third Country Training for safe blood and parasite control</li><li>➤ Giving lectures in medical schools and conducting courses by researchers</li><li>➤ Regional research and training collaboration</li></ul>
National /Regional Health Services	<p><b>【Surveillance Services】</b></p> <ul style="list-style-type: none"><li>➤ Contribution to the rapid response system for emerging and re-emerging infectious diseases</li><li>➤ Laboratory diagnostic services for the private sector</li></ul> <p><b>【Reference Services】</b></p> <ul style="list-style-type: none"><li>➤ Reporting to WHO as a Collaborating Centre</li></ul> <p><b>【Other services】</b></p> <ul style="list-style-type: none"><li>➤ Technical advice and consultations for the MOH</li><li>➤ Production of HEPCELL II and other diagnostic kits</li></ul>

Prepared by the investigation team