Chapter 4

Analysis of Communicable Diseases Group Institutes

4.0 List of institutes under Communicable diseases group

1. National JALMA Institute for Leprosy & Other Mycobacterial Diseases (NJILMD), **AGRA**
2. Tuberculosis Research Centre (TRC), **CHENNAI**
3. National Institute of Malaria Research (NIMR), **DELHI**
4. Centre for Research in Medical Entomology (CRME), **MADURAI**
5. Enterovirus Research Centre (ERC), **MUMBAI**
6. Rajendra Memorial Research Institute of Medical Sciences (RMRIMS), **PATNA**
7. Vector Control Research Centre (VCRC), **PONDICHERRY**
8. National Institute of Virology (NIV), **PUNE**
9. National AIDS Research Institute (NARI), **PUNE**
10. National Institute of Cholera and Enteric Diseases (NICED), **KOLKATA**
11. Regional Medical Research Centre, **DIBRUGARH**
12. Regional Medical Research Centre, **Port Blair**
13. Regional Medical Research Centre, **BHUBANESWAR**

The data from the following institutes/labs has not been received:

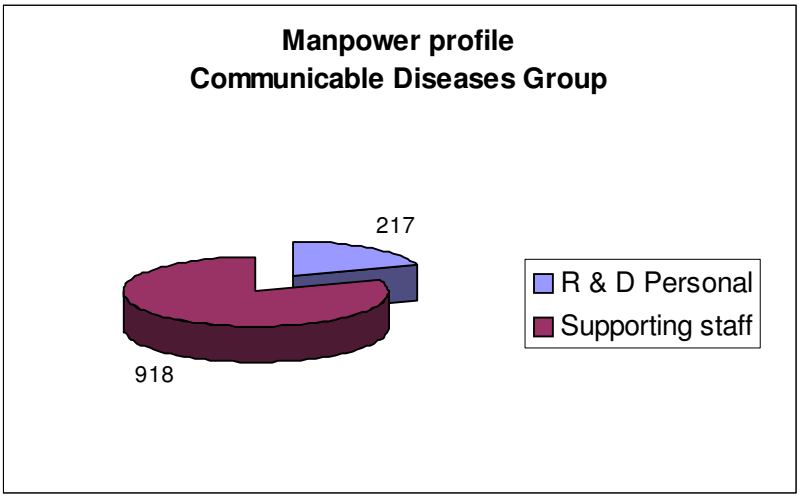
1. Enterovirus Research Centre (ERC), **MUMBAI**
2. Vector Control Research Centre (VCRC), **PONDICHERRY**
3. National Institute of Virology (NIV), **PUNE**

4.1 Overall analysis of institutes under Communicable diseases group

4.1.1 Manpower Profile

The thirteen institutes categorized in the Communicable Diseases group cover varied areas of research. The figure 4.1 below presents the manpower profile in terms of R&D personal and supporting staff of the 10 institutes/labs of Communicable Diseases group out of a total of 13 who have supplied the data.

Figure 4.1



4.1.2 Core Competency wise Manpower of the Communicable Diseases Group Institutes are given in Table 4.1

Table -4.1

Communicable Diseases Group				
Core Competency wise Manpower of various Institutes				
S. No.	**Name of laboratory**	**Area of Core Competency**	**Manpower (in Numbers)**	
			R&D Personal	**Supporting Staff**
1.	National JALMA Institute for Leprosy & Other Mycobacterial Diseases (NJILMD), **AGRA**	Microbiology& Molecular Biology	6	4
		Immunology	4	6
		Biochemistry	4	3
		Molecular Pathology	1	4
		Electron Microscopy	1	0
		Clinical Division	10	22
		Experimental Leprosy	1	5
		Biostatistics & Epidemiology	1	1
		Medical Sociology	0	1
2.	Tuberculosis Research Centre (TRC), **CHENNAI**	Clinical Trials (Operational Research)	17	58
		Epidemiological Research	8	400
		Bacteriology	6	38
		Immunology	5	7
3.	National Institute of Malaria Research (NIMR), **DELHI**	Vector Biology & Control	18	25
		Parasitology	11	14
		Epidemiology	6	10
4.	Centre for Research in Medical Entomology (CRME), **MADURAI**	Mosquito Systematics	1	5
		Diagnostics of arboviral diseases like JE & Dengue	1	5
		Surveillance of JE & Dengue	1	8
		Filariasis diagnosis and control	1	5
		Molecular Biology	1	5

S. No.	Name of laboratory	Area of Core Competency	Manpower (in Numbers)	
			R&D Personal	Support Staff
5.	Rajendra Memorial Research Institute of Medical Sciences (RMRIMS), **PATNA**	Molecular Biology (strain variation, molecular epidemiology)	2	1
		Immunology (diagnosis/ cellular immunology)	1	2
		Biochemistry (diagnosis, quality control/ assurance in clinical chemistry)	1	4
		Clinical Medicine (Clinical trial, drug resistance, co-infection)	4	9
		Vector control	3	5
		Microbiology	2	3
		HIV Serology	1	1
		Pathogenesis	1	1
		Animal care and management	1	1
6.	National AIDS Research Institute (NARI), **PUNE**	Clinical Science	3	1
		Epidemiology	3	5
		Immunology & Serology	2	7
		Virology & Molecular Virology	2	2
		Microbiology & Pathology	1	2
		Behavioral & Social Sciences	2	2
7.	National Institute of Cholera and Enteric Diseases (NICED), **KOLKATA**	Diarrhoeal diseases research	34	156
		Typhoid fever	5	15
		Helicobacter pylori infection	2	6
		Infective hepatitis	1	4
		HIV/AIDS	4	10
8.	Regional Medical Research Centre, **Dibrugarh**	Mosquito borne diseases	6	7
		HIV & Drug abuse	2	2
		Trematode infection	2	3
		Haemaglobinipathy	1	3
		Cancer Nasopharynx, Osophagus Stomach	1	1
		Cardio vascular disease	2	2

S. No.	Name of laboratory	Area of Core Competency	Manpower (in Numbers)	
			R&D Personal	Support Staff
9.	Regional Medical Research Centre, **Port Blair**	Epidemiology	2	5
		Microbiology	1	2
		Molecular Biology	3	1
		Entomology	1	1
10.	Regional Medical Research Centre, **Bhubaneswar**	Immunobiology of filariasis, malaria& other nematodoes.	5	6
		Designing & conducting clinical and epidemiological studies and other regional health problem.	6	11
		Strategic and operational research towards control / elimination of filariasis, micronutrient malnutrition and other regional health problems.	6	12
	Total		217	918

4.1.3 Major R&D facilities of the Communicable Diseases Group Institutes are given in Table 4.2

Table - 4.2

Communicable Diseases Group			
Major R&D facilities of various Institutes			
S. No.	**Name of laboratory**	**Area of Core Competency**	**Facilities**
1.	Nationall JALMA Institute for Leprosy & Other Mycobacterial Diseases (NJILMD), **AGRA**	Microbiology& Molecular Biology	Testing, Training facilities, Operational research facilities for doctors, Studies and Clinical trials.
		Immunology	
		Biochemistry	
		Molecular Pathology	
		Electron Microscopy	
		Clinical Division	
		Experimental Leprosy	
		Biostatistics & Epidemiology	
		Medical Sociology	
2.	Tuberculosis Research Centre (TRC), **CHENNAI**	Clinical Trails (Operational Research)	Training & operational research facilities for doctors
		Epidemiological Research	Training & operational research facilities for doctors
		Bacteriology	Smear microscopy and culture facilties for M.tuberculosis
		Immunology	Training facilites on molecular Epidemiology , Nuclei acid based diagnosis, Immunodiagnosis, DNA typing of HLA & non HLA genes, various immunological techniques.
3.	National Institute of Malaria Research (NIMR), **DELHI**	Molecular Biology/Immunology/ Biochemistry/Pharmacology laboratories	DNA sequencing, DNA synthesis, HPLC, Thermal Cyclers ,Ultra centrifuge and normal centrifuges, Spectophotometres, Kinetic Microplate Readers, Gel Doc System, Electrophoresis system, Laminar Flow, Ultra-deep freezer, Deep freezers and refrigerators.

		Insectary	Malaria vector species and being maintained for research work related to bio-efficacy tests, insecticide resistance—their biochemical and genetic basis, susceptibility of anophelines to malaria sporogony, molecular and biochemical basis of malaria susceptibility etc.
		Bioassay & Insecticide resistance lab	The laboratory is involved in bio-efficacy test, insecticide resistance study, biochemical and molecular basis of resistance.
		Parasite Bank	Parasite Bank which cultures and preserve characterized strains of filed collected P. falciparum and P. vivax strains
		Malaria Clinic	Testing for malaria and also subjected to various basic and applied research with their consent.
		Field Stations	Testing ground for various malaria control strategies, drug trials, insecticide trials etc.
S. No.	**Name of laboratory**	**Area of Core Competency**	**Facilities**
4.	Centre for Research in Medical Entomology (CRME), **MADURAI**	Diagnostics of arboviral diseases like JE & Dengue.	UV microscope, automatic Elisa Washer, Elisa reader,Thermal cycler, Gel Electrophorasis unit.
5.	Rajendra Memorial Research Institute of Medical Sciences (RMRIMS), **PATNA**	Molecular Biology 1. Facilities for providing training in the area of Biotechnology. 2. Basic and applied research	Trained personnel for PCR, RT-PCR, Southern Blotting, Micro-array, Gel-Doc with densitometer.
		Immunology 1. Facilities for providing training 2. Development of new sero-diagnostics 3. New diagnostics for clinical research 4. Basic research on disease manifestation, immuno suppression and immunomodulation	Technical persons and facialities available for Flow-Cytometry, immunological assays, mammalian cell culture, pathogen culture, electrophoresis, Western Blotting and PCR based studies.

		Clinical Bio-chemistry 1. Facilities for providing training 2. Facilities for clinical drug trials 3. Basic research on biochemical aspects of VL	Fully random access clinical biochemistry analyzer, semi-automated chemistry analyzer, Thombo-screen, Ion-selective analyzer, Flame-photometer
		Clinical Medicine 1. WHO/TDR reference center for clinical drug trial 2. Clinical research on VL and HIV-VL co-infection. 3. Patient care	Clinical experts and technical persons available for different aspect of patient care, Audiometry, Colour Doppler, ECG, X-ray, indoor ward for treatment.
		Vector Control 1. Insecticide/ kala-net based control 2. Sand-fly colony maintenance 3. Detection of infection by immunological and molecular based methods	Insectorium, Spray pump, CDC light trap, Facilities for Bio-assay
		Microbiology 1. Leishmania culture and its preservation 2. *L. donovani* unresponsiveness	Laminar Flow, BOD-Incubator, Sterilizing facilities, Tissue culture, Liquid Nitrogen.
		Patient Care	OPD, Indoor Patient ward with free treatment facilities.
		Animal Care	Animal House having BALB/c mice, C57 black mice, Rabbits for research.
		Pathology 1. Services 2. Research on VL and PKDL	Clinical pathology, haematology, immunohistochemistry
		Extension and training 1. On the job training course to Post Graduate students	Faculty members, infrastructure including class room, lab and library-facilities.
		Statistical Department 1. Services 2. Data analysis and record documentation	Trained persons for computer work station, data entry and analysis.
		Epidemiology 1. Field survey 2. Study of VL risk factors 3. Early prediction of disease by simple and suitable tools	Trained person for disease surveillance and epidemiological study.
		Social sciences 1. Sociological factors 2. IEC activities	Trained persons to conduct sociological studies.

		Internet facilities for all departments	Trained persons, LAN facility over 60 nodes spread through various departments and sections.
S. No.	**Name of laboratory**	**Area of Core Competency**	**Facilities**
6.	National AIDS Research Institute (NARI), **PUNE**	Laboratories	Well equipped laboratories to perform the following assays: Serology, Microbiology, Clinical pathology, Immunology, Molecular Virology.
		Pharmacy	Pharmacy that presently caters its services to seven clinics of NARI. The work activity is regular supply of primary care medicines to the clinics and procurement of these medicines as per requirement. In addition to the primary care medicines, NARI Central Pharmacy also participate in the antiretroviral clinical trials.
		Data Management	Faculties like computational infrastructure ,communications (Video conferencing)
		Clinical Sciences	The clinical sciences division has been operating through a network of 3 HIV referral clinics, 1 clinic dedicated to research on HIV prevention in women, 1 comprehensive health care clinic for sex workers, their children and their clients, Arogya Kendra and 2 clinics attached to Tuberculosis and Reproductive Tract Infections clinics of the Sassoon Hospital, Pune.
		Epidemiology	The highlights of Division of Epidemiology are the first cohort study on HIV discordant couples, clinical trials and acceptability studies of vaginal microbicides and the initiation of the first AIDS vaccine trial in India.

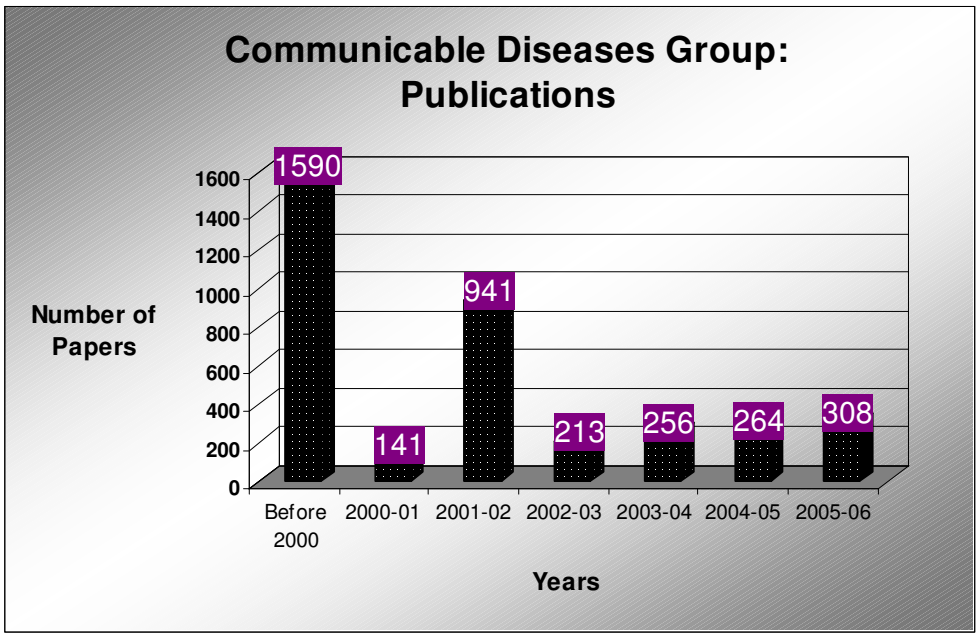
		Behavioral & social Sciences	Development of education material for adolescents and field-testing of the models. Emphasis placed on strengthening community participation in the research through Community Advisory Board and community involvement plan.
S. No.	**Name of laboratory**	**Area of Core Competency**	**Facilities**
7.	National Institute of Cholera and Enteric Diseases (NICED), **KOLKATA**	Diarrhoeal diseases research	1. Hospital facilities for clinical trials 2. Rural and urban field area for epidemiological studies 3. High standard laboratories for basic research e.g. molecular epidemiology of bacterial pathogens, hybridoma facilities, DNA sequencing, transgenic animal facilities, electron microscopy, immunology for attempt of vaccine development.
8.	Regional Medical Research Centre, **Dibrugarh**	Genomic and pesteonomic	PCR,PFGE, 2-D etertophorasis, Protein purification ,DNA Sequencing
		Haematological studies	Cell counter, Flowcytometer
		Biochemical studies	Auto analyzer, Spectrophotometer , HPLC, Ion Chromatograph, Flurometer, Flurorescet, phase contrast etc.
		Micoscopes	Flurorescet, Phase contrast etc
		Virology	Tissue culture
		Bacteriology/Mycology	Bectech system, Isolation , Identification, Drug sensitivity
		Parasitology	Parasite culture, Identification ,Genomic work
		Epedemilogy	Computer, V-SAT,Internet
		Animal house	Experimentation facility, Experimental model Development

S. No.	Name of laboratory	Area of Core Competency	Facilities
9.	Regional Medical Research Centre, **Port Blair**	Molecular Biology	Genetic studies, Gene cloning and expression, gene sequencing, protein purification, molecular diagnostics, molecular characterization of pathogens.
		Immunology	Development of Diagnostics
10.	Regional Medical Research Centre, **Bhubaneswar**	Immunobiology of filariasis, malaria& other nematodoes.	Fluocytometer, Micro plate reader, B-gamma counter, Micro-array PCR.
		Designing & conducting clinical and epidemiological studies and other regional health problem.	Scientist & technical manpower, Field units, Computer facility, Collaboration with local health departments.
		Strategic and operational research towards control / elimination of filariasis, micronutrient malnutrition and other regional health problems.	Technical manpower, Field units, Laboratory methods for IDD, HB disorder, Malnutrition.

4.1.4 Papers

The following figure 4.2 represents the total number of papers published by the 10 institutes/labs out of 13 institutes in the Communicable Diseases group from 2000 to 2006:

Figure 4.2



It is evident from the figure that there is abrupt increase in the total number of publications in year 2001-02. However from the year 2002-03 to 2005-06 there is a gradual increase in the publication of papers.

4.1.5 Exportable R&D facilities of the Communicable Diseases Group Institutes are given in Table 4.3

Table -4.3

Communicable Diseases Group			
R&D Services of various Institutes			
S. No.	**Name of laboratory**	**R&D services offered**	**Description of R&D service offered**
1.	National JALMA Institute for Leprosy & Other Mycobacterial Diseases (NJILMD), **AGRA**	Consultancy services Studies Contract Research Technology Transfer Specialized facilities / services Clinical Trials Supply of information / Database	1. Diagnostics & Testing 2. Testing of Vaccines 3. Testing of Therapentics
2.	Tuberculosis Research Centre (TRC), **CHENNAI**	Testing Training Consultancy services Surveys Studies Clinical Trials	Training facilities offered to medical and non-medical staff.
3.	National Institute of Malaria Research (NIMR), **DELHI**	Testing Training Consultancy services Surveys Studies Contract research Clinical trials	1. Training including certificate course to nationals of Southeast, South Asia and Middle East countries. 2. Workshop/training programme sponsored 3. Laboratory based specialized training
4.	Centre for Research in Medical Entomology (CRME), **MADURAI**	Testing Training Consultancy services Surveys Contract research Specialized facilities/services Supply of information/database	1. Research & Diagnostic facilities extended to state health authorities. 2. Consultancy services offered to contain the out threats of Japanese encephalitis and dengue.

S. No.	Name of laboratory	R&D services offered	Description of R&D service offered
5.	Rajendra Memorial Research Institute of Medical Sciences (RMRIMS), PATNA	Testing Training Consultancy services Surveys Studies Specialized facilities / services Clinical Trials Supply of information / Database	1. Clinical trials for drugs like Miltefosine (WHO / TDR / CMR / Zentaris), Paramomycine (iOWH, USA), Sitamaquine (Glaxo Smithkline). 2. Slow release emulsified suspension of Malathion Spray (WHO/TDR). 3. Monitoring of DDT spray 4. Techno-ecological vector control. 5. Developed a sensitive culture media for diagnosis of Kala- azar.
6.	National AIDS Research Institute (NARI), **PUNE**	Testing Training Consultancy services Surveys Specialized facilities/services Clinical Trials	1. HIV discordant couples, clinical trials and acceptability studies of vaginal microbicides. 2. Testing of various compounds and herbal products for anti-HIV activity. 3. Nucleic Acid Testing by PCR, Serological tests, Blood chemistry and serum electrolytes. 4. Development of education material for adolescents and field-testing of the models

S. No.	Name of laboratory	R&D services offered	Description of R&D service offered
7.	National Institute of Cholera and Enteric Diseases (NICED), **KOLKATA**	Testing Training Consultancy services Surveys Studies Contract research Technology Transfer Clinical Trials Supply of information/database	1. Research on applied and basic sciences related to diarrhoeal diseased, typhoid fever, infective hepatitis, helicobacter pylori infection and HIV/ AIDS 2. Training programme for medical and paramedical personnel in clinical management and diagnostic aspects.
8.	Regional Medical Research Centre, **Dibrugarh**	Testing Training Consultancy services Surveys Studies Contract research Technology Transfer Specialized services Clinical Trials Supply of information/database	PCR, DNA Sequencing Cell counter, Flowcytometer, Tissue culture, Parasite culture, Identification
9.	Regional Medical Research Centre, **Port Blair**	Testing Training Consultancy services Surveys Studies Clinical Trials Supply of information/database	Genetic studies, Gene cloning, Gene sequencing, Protein purification, Molecular diagnostics, Molecular characterization of pathogen, Development of diagnostics
10.	Regional Medical Research Centre, **Bhubaneswar**	Testing Training IPR services Technology Transfer	Training for doctors, Testing for sick ling disorders, filarial, Malaria, IDD and Hepatitis.

4.2 Analysis of individual institutes under the Communicable diseases group

4.2.1 National JALMA Institute for Leprosy & Other Mycobacterial Diseases (NJILMD), AGRA

The Institute has a major thrust on leprosy (70%) and relevant areas of tuberculosis (20%) as well as HIV (10%). During its existence as a research Institute under ICMR the scientists of the Institute have continued to contribute towards better understanding of disease process of leprosy by carrying out studies on nerve ectrophysiology, pathology and immunopathology of disease process using immunological, molecular and electron microscopic tools. The other major focus was on developing technologies for diagnosis, which includes development of probes, and methods for improving the histological diagnosis.

While efforts are continuing to maintain and further strengthen infrastructure for mouse footpad studies, the focus of the Institute has moved to new generation molecular methods for detection of drug resistance. Various drug regimens designed and tried at the Institute have provided valuable information that will be relevant for improvement of medical treatment. Studies on tuberculosis focus on drug resistance, molecular epidemiology and some intervention strategies. Investigations on drug permeability and drug metabolism are providing newer information. Studies on surgical management of leprosy-associated problems are aimed at prevention and correction of deformities as well as chronic problems like plantar ulcers. Development of molecular methods for investigating the epidemiology of tuberculosis, leprosy and other mycobacterial infections has made significant progress. Similarly research on drug resistance has common focus on tuberculosis and leprosy. These studies have led to development of newer molecular techniques.

Studies on host genetics continue to focus our new susceptibility genes. The Institute has established state-of-the-art BSL-3 Labs (one for Microbiology & Molecular Biology and other for Animal Studies), Microarray facility and DNA as well as protein sequencing etc. The activities of the Institute in the area of AIDS are moving towards addressing some important research questions like relationships between HIV & leprosy and HIV & tuberculosis. Epidemiological

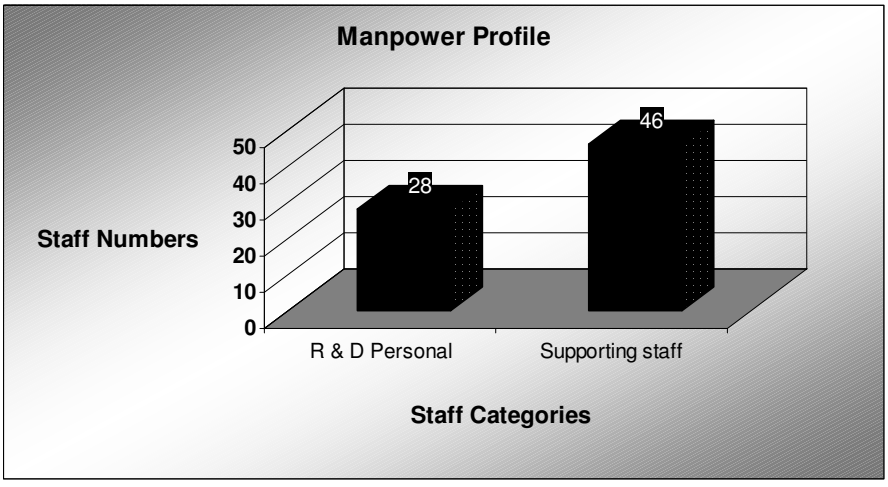
studies on protection, transmission dynamics and effect of various interventions are progressing well.

The institute has established its leadership in all important aspects of leprosy and mycobacterial research. The Institute is participating in and co-coordinating several multi-centric studies. It is serving as a National Repository for Mycobacteria and is a Reference centre for HIV screening. Not only has the Institute been rapidly progressing by establishing modern molecular and other laboratories like P3 and Micro array laboratories but has also been tirelessly helping in the transfer of technology to other users. The involvement in training (MD/MS/Ph.D.1M.VSc & M.Sc & M.Sc. students/scientists/teachers) of vital manpower in modern techniques has been very substantial. Participation of several scientists as experts is also an indirect contribution of Institute in shaping up the research programmes of the country.

4.2.1.1. Manpower profile

The following figure 4.3 shows the manpower profile of NJILMD

Figure 4.3



4.2.1.2. Areas of Core Competency

The following Table 4.4 gives available manpower in each of the areas of core competency of the institute.

Table 4.4

S.No	Area	Manpower (Nos.)	
		R & D Personal	***Support staff***
1.	Microbiology& Molecular Biology	6	4
2.	Immunology	4	6
3.	Biochemistry	4	3
4.	Molecular Pathology	1	4
5.	Electron Microscopy	1	0
6.	Clinical Division	10	22
7.	Experimental Leprosy	1	5
8.	Biostatistics & Epidemiology	1	1
9.	Medical Sociology	0	1

4.2.1.3. Major R&D Facilities

The following Table 4.5 gives various R&D facilities support the above areas of competency:

Table 4.5

S.No	Area	Facilities
1.	Microbiology& Molecular Biology	Testing, Training facilities, Operational research facilities for doctors, Studies and Clinical trials.
2.	Immunology	
3.	Biochemistry	
4.	Molecular Pathology	
5.	Electron Microscopy	
6.	Clinical Division	
7.	Experimental Leprosy	
8.	Biostatistics & Epidemiology	
9.	Medical Sociology	

4.2.1.4. Patents

The following patents are applied by NJILMD during 2004-05.

Year	Patents Applied	
	India	Subject of Patent
2004-05	4	Drug resistance, Metabolism & finger printing of Mycobacteria

4.2.1.5. National / International Accreditations

The NJILMD has recognized as a national mycobacterial repository centre in DBT

4.2.1.6. Number of collaborations/ Affiliations

The NJILMD has following national collaborations with the following institutes / organizatons:

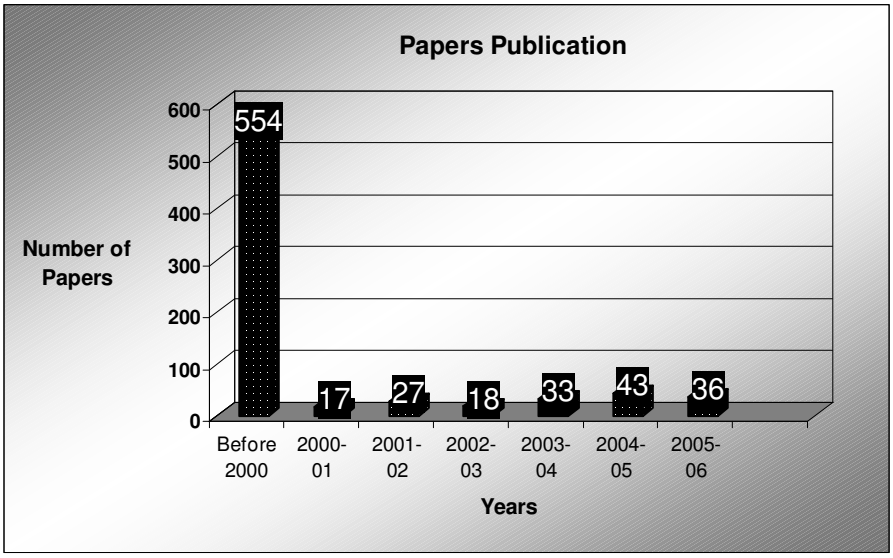
1. CDFD Hyderabad
2. IISc Bangalore
3. AIIMS Delhi
4. NII Delhi
5. TBDC Delhi.

and international collaborations with Institute of Pasteur, France

4.2.1.7. Papers

The following figure 4.4 gives the details of the number of papers published by NJILMD during 2000 and 2006:

Figure 4.4



(For details about the publications of NJILMD, refer institute website)

4.2.1.8. Potential Exportable R & D services

NJILMD has identified the following as their potential exportable R&D services:

1. Testing (Vaccines, Therapeutics)
2. Consultancy Services
3. Studies
4. Contract Research

5. Technology Transfer
6. Specialized facilities / services
7. Clinical Trials
8. Supply of information / Database

4.2.2 Tuberculosis Research Centre (TRC), CHENNAI

The Tuberculosis Chemotherapy Centre (TCC), which was established at Madras (Chennai) in 1956 (under the joint auspices of the Indian Council of Medical Research, the Government of Tamil Nadu, the World Health Organization and the British Medical Research Council) to undertake studies on the domiciliary application of chemotherapy in the treatment of pulmonary tuberculosis, was renamed as the Tuberculosis Research Centre (TRC) in 1978, in keeping with the expanded scope and widened sphere of its activities. The Centre has intensified its efforts not only to evolve but also to operationalise effective and less expensive short course chemotherapeutic regimens for tuberculosis on a domiciliary basis.

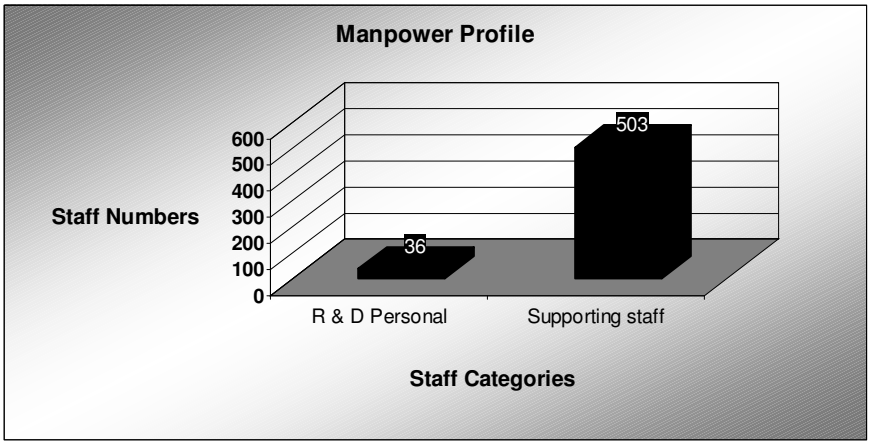
Many of the research findings of the Centre have received world-wide recognition and acceptance and some of them have had a significant impact on the formulation of tuberculosis control programmes in Asia, Africa, South America and some parts of Europe. The Centre has demonstrated that supervised administration of anti tuberculosis drugs twice weekly is as efficacious as daily self administered treatment. The DOTS (directly observed treatment short-course) is currently a globally accepted programme for control of tuberculosis. The Centre imparts training in controlled clinical trials and laboratory aspects of tuberculosis. TRC has demonstrated the efficacy of ambulatory, short course (6 months) treatment for tuberculosis of the spine in a randomized controlled trial. This helps in avoiding major radical spinal surgery that needs special facilities and expertise.

The Centre continues to focus attention on evolving comprehensive methodologies for strengthening the case-finding and case-holding components of the National Tuberculosis Programme (NTP) both in rural and urban areas. The Centre also undertakes research in the area of immunology and molecular epidemiology.

4.2.2.1. Manpower profile

The following figure 4.5 depicts the manpower profile of TRC

Figure 4.5



4.2.2.2. Areas of Core Competency

The following Table 4.6 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.6

S.No	Area	Manpower (Nos.)	
		R & D Personal	***Support staff***
1.	Clinical Trials (Operational Research)	17	58
2.	Epidemiological Research	8	400
3.	Bacteriology	6	38
4.	Immunology	5	7

4.2.2.3. Major R&D Facilities

The following Table 4.7 gives various R&D facilities support the above areas of competency:

Table 4.7

S.No	Area	Facilities
1.	Clinical Trials (Operational Research)	Training & operational research facilities for doctors
2.	Epidemiological Research	Training & operational research facilities for doctors
3.	Bacteriology	Smear microscopy and culture facilities for M.tuberculosis

4.	Immunology	Training facilites on molecular Epidemiology , Nuclei acid based diagnosis, Immunodiagnosis, DNA typing of HLA & non HLA genes, various immunological techniques.

4.2.2.4. Important Studies and Trials

TRC has conducted the following important studies and trials:

1. Cingleput BCG vaccine trial
2. Impact of home –sanatorium study for the national tuberculosis programme.
3. Various controlled clinical trials for pulmonary and extra pulmonary TB.

4.2.2.5. Centres in TRC

TRC has following Centres:

1. WHO centre for tuberculosis research and training.
2. WHO reference centre for the study of the bacteriology of mycobacteria.
3. International center for excellence in research funded by NIAID/NIH, USA.
4. A HIV vaccine trail centre funded by IAVI, New York , USA.

4.2.2.6. Collaborative works

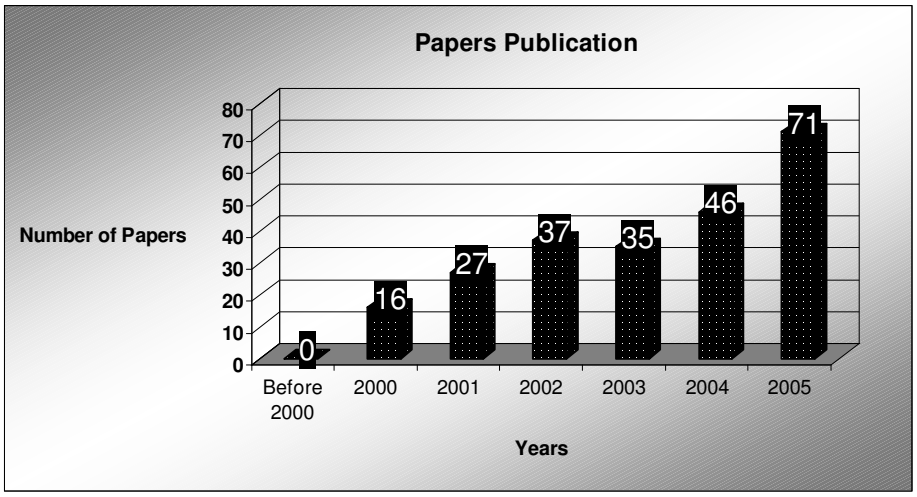
TRC has done the following works in collaboration with international agencies:

1. Clinical, Epidemiological Tuberculosis Research in collaboration with World Health Organization.
2. Indo –US collaboration – HIV vaccine trial, Laboratory research.
3. Indo – French collaboration – Immunology diagnosis & Molecular Epidemiology
4. Indo – German collaboration – Immunodiagnostics.

4.2.2.7. Papers

The following figure 4.6 gives the details of the number of papers published by TRC during 2000 and 2006:

Figure 4.6



(For details about the publications of TRC, refer institute website)

4.2.2.8. Potential Exportable R & D services

TRC has identified the following as their potential exportable R&D services:

a. Type of R & D services offered

1. Testing
2. Training
3. Consultancy Services
4. Surveys
5. Studies
6. Clinical Trials

b. Description of R & D service offered

1. Training facilities offered to medical doctors on operational research connected with revised national Tuberculosis program.
2. Training facilities offered to laboratory personal on smear microscopy and M. Tuberculosis culture.

4.2.2.9. Target Markets

The following target markets have been identified for the above services:

S.No	Area	Countries
1.	Clinical Trails (Operational Research)	Third world countries
2.	Epidemiological Research	
3.	Bacteriology	
4.	Immunology	

4.2.2.10. Constraints & Suggestions

TRC highlighted Marketing Policies of laboratory as the constraints that they faced in providing R & D services in India as well as abroad. It was suggested that establishing collaboration with industries could help to overcome these constraints for enhancing exports of R&D Services.

4.2.3 National Institute of Malaria Research (NIMR), DELHI

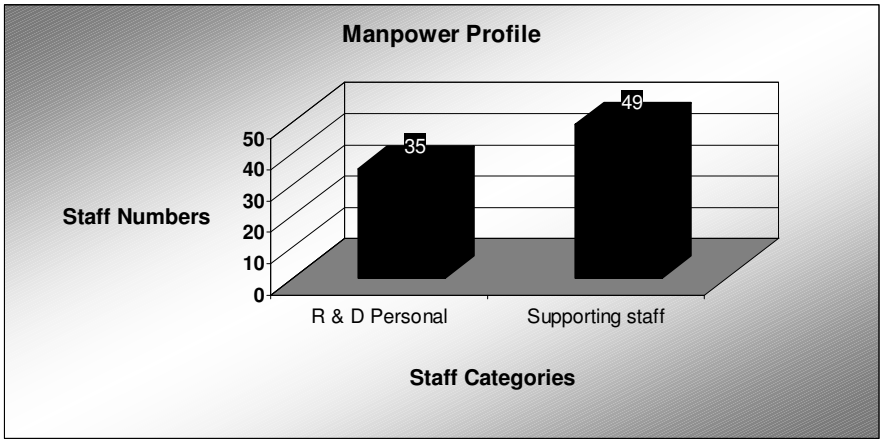
The Malaria Research Centre (MRC) was established in 1977 in Delhi. The mandate of the Centre was to provide short and long-term solutions to the technical problems faced by the NMEP. Initially the primary task of the MRC was to organize result oriented field research on problems requiring immediate attention *i.e.* estimation of incidence of malaria, testing of new insecticides, biology of *Anopheles culicifacies*, *etc*. Subsequently long-term basic and applied research was initiated to provide alternative methods of vector control. New technologies were developed and tested in the field. The technical programmes of the Centre may be broadly classified into the disciplines of vector biology and control, genetics and cytogenetics, parasitology, pharmacology and epidemiology. Emphasis is being placed on molecular biology, biochemistry and molecular epidemiology. In addition, a major field research programme was directed to demonstrate malaria control by bioenvironmental control interventions at 13 field stations situated in different geographical regions, addressing the local problem, and providing training to health staff. Close linkages and scientific collaboration have been established with WHO, UNDP, NMEP and national and international laboratories. The MRC has published several books, monographs, and

proceedings and publishes periodicals such as the Malaria *Patrika* and the Indian Journal of Malariology.

4.2.3.1. Manpower profile

The following figure 4.7 depicts the manpower profile of NIMR

Figure 4.7



4.2.3.2. Areas of Core Competency

The following Table- 4.8 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.8

S.No	Area	Manpower (Nos.)	
		R & D Personal	***Support staff***
1.	Vector Biology & Control	18	25
2.	Parasitology	11	14
3.	Epidemiology	6	10

4.2.3.3. Major R&D Facilities

The following R&D facilities support the above areas of competency:

i. **Molecular Biology/Immunology/Biochemistry/Pharmacology laboratories**

   NIMR has well equipped laboratories with following major equipments to cater the need of scientists in the field of molecular biology, biochemistry, immunology, pharmacology and other disciplines.

1. DNA sequencing (with ABI Prism 310 DNA Sequencer)
2. DNA synthesis (ABI DNA Synthesizer)
3. HPLC
4. Thermal Cyclers
5. Ultra centrifuge and normal centrifuges
6. Spectophotometres,
7. Kinetic Microplate Readers,
8. Gel Doc System,
9. Electrophoresis system,
10. Laminar Flow,
11. Ultra-deep freezer,
12. Deep freezers and refrigerators

ii. Insectary

NIMR has colonized several major malaria vector species and being maintained for research work related to bio-efficacy tests, insecticide resistance—their biochemical and genetic basis, susceptibility of anophelines to malaria sporogony, molecular and biochemical basis of malaria susceptibility etc. Currently we have colonized a 100% Plasmodium refractory Anopheles culicifacies which is subjected to molecular and biochemical basis of insect immunity for future research in the field of developing transgenic mosquitoes.

The major malaria vector species being maintained in insectaries are—An. culicifacies species A, B and C, Anopheles fluviatilis T and U, different starins of Anopheles stephensi, Anopheles sundiacus.

iii. Bioassay and insecticide resistance lab

The laboratory is involved in bio-efficacy test, insecticide resistance study, biochemical and molecular basis of resistance.

iv. Parasite Bank

NIMR has a Parasite Bank which cultures and preserve characterized strains of filed collected P. falciparum and P. vivax strains. Beside human malaria parasites, parasite bank has rodent malaria parasites. The parasite bank serves as a national resource for malaria parasite to undertake studies by various laboratories. The parasite bank also has facility of in-vitro parasite culture and studying drug resistance study

v. Malaria Clinic

Several malaria clinics are available where patients are tested for malaria and also subjected to various basic and applied research with their consent.

vi. Field stations

NIMR has 10 field stations located in different parts of India that serves as testing ground for various malaria control strategies, drug trials, insecticide trials etc.

vii. Animal House

An Animal House which maintains various strains of rodents that are used by scientists for experimental purposes.

4.2.3.4. National / International Certification

The NIMR has following certifications:

Recognized by WHO as a reference center for the identification of sibling species of Anopheles culicifacies complex.

4.2.3.5. Patents

The following table gives the details of the number of patents applied by and granted to NIMR during 2000-01 to 2004-05.

Patent No.	Patent Title	Author	Date of Publication
1195/DEL/2004	Use of Solanum nigrum extract as lavicidal agent	Raghavendra K	2001
Indian Patent No.189970 [3280/DEL/98]	New Tissue Schizontocidal and Gametocytocidal Drug in the Treatment of Malaria	Dua VK	NA
Applied for [Priority no. 3224/DEL/2005]	A New Plant Based Insecticide For Mosquitoes Control	Dua VK	NA

4.2.3.6. Number of collaborations/ Affiliations

The NIMR has following collaborations:

Research Collaborators

1. International Centre for Genetic Engineering and Biotechnology, New Delhi
2. CDC, Atlanta
3. All India Institute of Medical Sciences, New Delhi
4. Central Drug Research Institute, Lucknow

PhD programme

1. Delhi University, Delhi
2. MD University, Rohtak
3. CCS University Meerut
4. Indraprastha University, Delhi

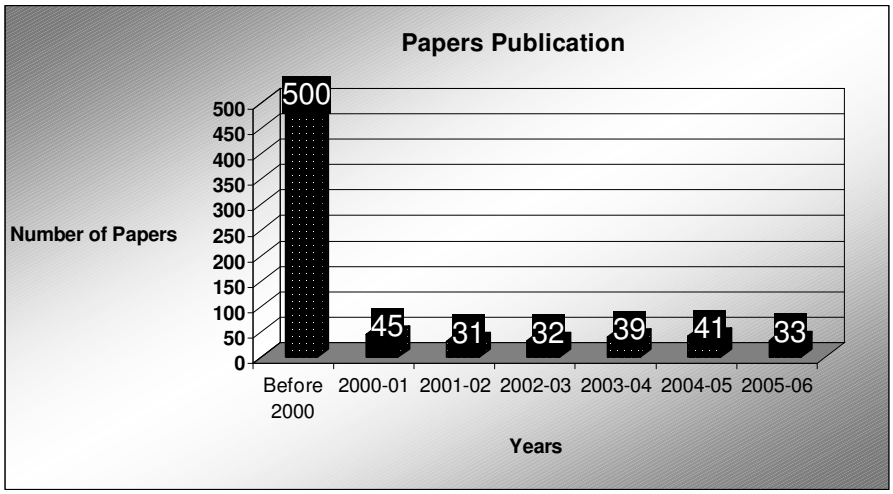
Funding agencies

1. Department of Biotechnology, New Delhi
2. Department of Science & Technology, New Delhi
3. Defense Research and Development Organization, Defense Research Laboratory
4. World Health Organization, TDR
5. WHO Pesticides Evaluation Scheme
6. Medicine for Malaria Ventures (MMV), Geneva
7. Swedish International Development Authority

4.2.3.7. Papers

The following figure 4.8 gives the details of the number of papers published by NIMR during 2000 and 2006:

Figure 4.8



(For details about the publications of NIMR, refer institute website)

4.2.3.8. Potential Exportable R & D services

NIMR has identified the following as their potential exportable R&D services:

Type of R&D services offered:

1. Testing
2. Training
3. Consultancy Services
4. Surveys
5. Studies
6. Contract research
7. Clinical trials

4.2.3.9. Target Markets

The following target markets have been identified for the above services:

S.No	Area	Countries
1.	Vector Biology and Control	Countries of South-east, South- asia and Middle -east
2.	Parasite Biology	
3.	Epidemiology	

4.2.3.10. Constraints & Suggestions

NIMR highlighted Bureaucratic bottlenecks (Time-consuming and lengthy procedure for clearance in dealing with foreigners' involvement), Lack of resources (NIMR don't have adequate space/own building) as the constraints that they faced in providing R & D services in India as well as abroad. It was suggested that following could help to overcome these constraints for enhancing exports of R&D Services:

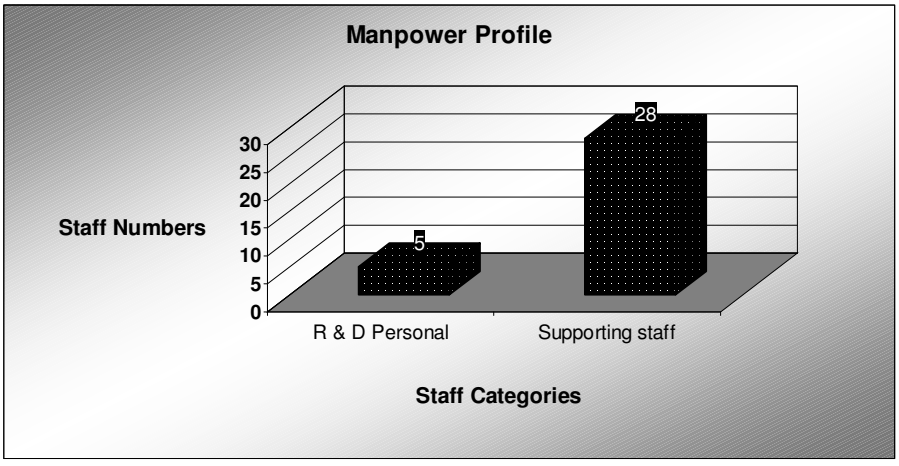
1. There should be single window clearance mechanism of all the proposals related to exporting of R&D is involved.
2. The maximum period for clearance of any proposal involving export of R&D should be 3 months.

4.2.4 Centre for Research in Medical Entomology (CRME), MADURAI

4.2.4.1. Manpower profile

The following figure 4.9 depicts the manpower profile of CRME

Figure 4.9



2. Areas of Core Competency

The following Table 4.9 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.9

S.No	Area	Manpower (Nos.)	
		R & D Personal	Support staff
1.	Mosquito Systematics	1	5
2.	Diagnostics of arboviral diseases like JE & Dengue	1	5
3.	Surveillance of JE & Dengue	1	8
4.	Filariasis diagnosis and control	1	5
5.	Molecular Biology	1	5

4.2.4.3. Major R&D Facilities

The following Table 4.10 gives various R&D facilities support the above areas of competency:

Table 4.10

S.No	Area	Facilities
1.	Diagnosis of JE & Dengue	UV microscope, automatic Elisa Washer, Elisa reader,Thermal cycler, Gel Electrophorasis unit.

4.2.4.4. National / International Accreditations

The CRME has recognized accreditations from WHO health organization collaborating center for filariasis and dengue.

4.2.4.5. Patents

The CRME has applied one Indian patent in the year 2005-06

4.2.4.6. Number of collaborations/ Affiliations

The CRME has following collaborations:

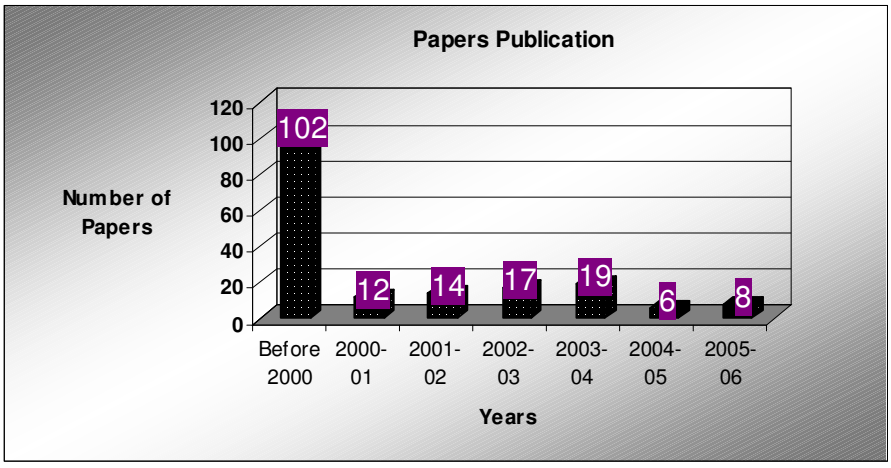
1. TDR / World Health Organization, Geneva.
2. Centre for disease control and prevention , Atlanta -USA

3. National vector borne disease control programme ,Delhi
4. International Water Management Institute , Sri Lanka
5. Defense research & Development establishment , Gwalior
6. Department of Public Heath & Preventive Medicine, Chennai.
7. National Institute of Virology, Pune

4.2.4.7. Papers

The following figure 4.10 gives the details of the number of papers published by CRME during 2000 and 2006:

Figure 4.10



(For details about the publications of CRME, refer institute website)

4.2.4.8. Potential Exportable R & D services

CRME has identified the following as their potential exportable R&D services:

Type of R & D services offered

1. Testing (Diagnostic facilities to state health authorities)
2. Training
3. Consultancy Services (Contain the out threats of Japanese encephalitis and dengue)
4. Surveys
5. Contract research
6. Specialized facilities/services
7. Supply of information/database

4.2.4.9. Target Markets

The following target markets have been identified for the above services:

S.No	Area	Countries
1.	Mosquito Sublimates	USA, Malaysia, Australia, Thailand
2.	Surveillance of JE/DEN	Singapore, Thailand
3.	Filareasis-Diagnostic & control	None
4.	Molecular Biology	Thailand

4.2.4.10. Constraints & Suggestions

CRME highlighted Marketing policies of laboratory, Lack of market information, inadequate market capabilities and National regulations as the constraints that they faced in providing R&D services in India as well as abroad. It was suggested that following could help to overcome these constraints for enhancing exports of R&D Services:

1. Manpower enhancement.
2. Training for the scientists and technical staff.
3. Animal house Infrastructure.
4. Up gradation of Laboratory.

4.2.5 Enterovirus Research Centre (ERC), MUMBAI

The Council's Enterovirus Research Unit located at the Haffkine Institute, Bombay, was upgraded in 1981 as the Enterovirus Research Centre (EVRC). The EVRC is engaged in studies on all major enteroviruses including poliomyelitis.

Based on the experimental data obtained, the Centre offers views/suggestions on national policies relating to the control of poliomyelitis, especially on the strategies of vaccination.

4.2.6. Rajendra Memorial Research Institute of Medical Sciences (RMRIMS), PATNA

Rajendra Memorial Research Institute of Medical Sciences (RMRI), Agamkuan, Patna is one of the permanent Institutes of Indian Council of Medical Research, New Delhi an autonomous body of Ministry of Health and Family Welfare, Govt. of India. The institute has an area of nine acre of land with research wing, administrative wing and residential quarters for the staff. Its main thrust is research in different aspects of Visceral Leishmaniasis like Clinical, Vector biology and control, Immunological, Biochemical, Molecular biology, Pathological, Parasitological and Social.

The Institute started functioning primarily as a chest institute and the departments for the purpose created were as follow: i.e., Department of Clinical Medicine, Department of Pneumoconiosis, Department of Cardio Respiratory Physiology, Department of Radiology, Department of Pathology, Department of Microbiology, Department of Biochemistry and Department of Pharmacology & Drug Research. In addition, a small Library, Statistical Section, Photography and Workshop were also opened. At the first instance functioning of the outpatient and the clinical department was started. The institute started the research works on Pneumoconiosis and tropical eosinophilia as a tribute to the first president of India as well as the demand of this area at that time.

When Kala-azar broke out in an epidemic form in Bihar in 1977, investigations on the disease were started of the affected area by the scientists of the Institute and tests in the laboratory were planned. Workshop on Kala-azar sponsored by W.H.O. and the Institute was organized in 1982 in which several national and international scientists working in the field of the disease participated. Later on, an attempt was made on study of Nutrition and Infectious Diseases. The institute from April 1, 1981 became a part of the Indian Council of Medical Research under the Ministry of Health and Family Welfare, Govt. of India. Like other permanent institutes of the Indian Council of Medical Research, the scientific officers and other members of the staff were provided all the advantages of service. The past services, prior to take over of the Institute of the employees were taken into

account for pension and gratuity as per Government of India rules. It started functioning as a Centre of Study and Research on Kala-azar and other Parasitological Diseases. The departments of the Institute were reorganized as follows: Division of Clinical Medicine, Division of Microbiology, Division of Pathology, Division of Immunology, Division of Epidemiology, Division of Entomology and Division of Biochemistry.

The ancillary sections made, were Radiology, Statistics and Audiovisual. Dr. A.B.Sen, an eminent scientist of the country, joined the Institute as the first full time Director in August 1986 under ICMR. The Indian Council of Medical Research bestowed full financial power and control of the administration of the institute that his predecessors did not have. Under his direction, the research activities of the Institute accelerated considerably and several measures were adopted to streamline the administration. Dr.R.Prabhakar later joined as the Director of the institute from 1992 to 1994 with dual charge. He was also the Director of Tuberculosis Research Center, Madras. Later, Dr.S.K.Kar joined as Director in 1994 till 2000. During these tenures, the institute did several projects on Visceral Leishmaniasis and a WHO/TDR project on Malathion suspension for control strategy programme was successfully carried out.

Present Director Dr.S.K.Bhattacharya joined in the year 2000, and the institute got a new dimension in research .The institute and scientists got international exposure under his guidance .The Clinical trial (Phase III) on Orally administered drug Miltefosine in children suffering from Visceral Leishmaniasis was successfully carried out for the first time in the institute under the aegis of WHO/TDR. The research on Phase III Clinical trial was conducted so well and as per the WHO/TDR guidelines that the institute again got a WHO/TDR/ICMR sponsored project for Phase IV open clinical trial on orally administered Miltefosine. This orally administered drug Miltefosine has become a boon for the poor patients suffering from Kala-azar and this was widely appreciated by WHO. During this period, a lot of modern equipment were purchased, i.e., fully automated random access clinical chemistry analyzer, semi automated auto analyzer, blood cell counter, ion selective analyzer, UV-spectrophotometer, flow cytometer, PCR equipment, etc. to further upgrade the laboratories.

The institute's laboratories are assessed regularly by the WHO/TDR clinical monitors. The laboratories are under regular external quality assessment through Christian Medical College, Vellore. Recently, Institute for One World Health, San Francisco, USA and WHO/TDR have sponsored a clinical trial project on injectable Paramomycin in the treatment of Visceral Leishmaniasis.

A modern library, seminar room, auditorium have been developed in this period to give the institute a modern look. A joint Coordination Committee (JCB) member of WHO/TDR meeting was held for the first time in India in 2003 in this institute. The modern facilities for research were greatly appreciated by the JCB members of WHO/TDR.

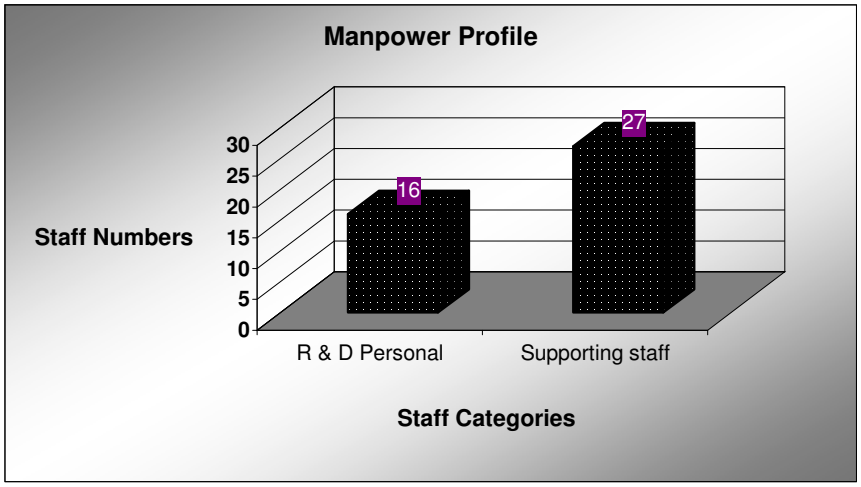
Glaxo SmithKline has recently sponsored a project to see the renal impairment in Visceral Leishmaniasis patients who are undergoing antileishmanial treatment.
Molecular level work on vector of Kala-azar (sand fly), and parasite are major areas of research. The institute's is also involved in the field-based study on various social aspects. Besides this, the institute is also doing research work on HIV/AIDS. The State Govt. of Bihar has identified this institute as a surveillance center for HIV/AIDS.

During the past few years, several scientists have attended international conferences and training in several countries like Greece, Canada, Australia, Switzerland, France, Italy, U.S.A., and Thailand. The institute has gradually reached the international level.

4.2.6.1. Manpower profile

The following figure 4.11 depicts the manpower profile of RMRIMS

Figure 4.11



4.2.6.2. Areas of Core Competency

The following Table 4.11 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.11

S.No	Area	Manpower (Nos.)	
		R & D Personal	***Support staff***
1.	Molecular Biology (strain variation, molecular epidemiology)	2	1
2.	Immunology (diagnosis/ cellular immunology)	1	2
3.	Biochemistry (diagnosis, quality control/ assurance in clinical chemistry)	1	4
4.	Clinical Medicine (Clinical trial, drug resistance, co-infection)	4	9
5.	Vector control	3	5
6.	Microbiology	2	3
7.	HIV Serology	1	1
8.	Pathogenesis	1	1
9.	Animal care and management	1	1

4.2.6.3. Major R&D Facilities

The following Table 4.12 gives various R&D facilities support the above areas of competency:

S.No	Area	Facilities
1	Molecular Biology 1. Facilities for providing training in the area of Biotechnology. 2. Basic and applied research	Trained personnel for PCR, RT-PCR, Southern Blotting, Micro-array, Gel-Doc with densitometer.
2.	Immunology 1. Facilities for providing training 2. Development of new sero-diagnostics 3. New diagnostics for clinical research 4. Basic research on disease manifestation, immuno suppression and immunomodulation	Technical persons and facialities available for Flow-Cytometry, immunological assays, mammalian cell culture, pathogen culture, electrophoresis, Western Blotting and PCR based studies.
3.	Clinical Bio-chemistry 1. Facilities for providing training 2. Facilities for clinical drug trials 3. Basic research on biochemical aspects of VL	Fully random access clinical biochemistry analyzer, semi-automated chemistry analyzer, Thombo-screen, Ion-selective analyzer, Flame-photometer
4.	Clinical Medicine 1. WHO/TDR reference center for clinical drug trial 2. Clinical research on VL and HIV-VL co-infection. 3. Patient care	Clinical experts and technical persons available for different aspect of patient care, Audiometry, Colour Doppler, ECG, X-ray, indoor ward for treatment.
5.	Vector Control 1. Insecticide/ kala-net based control 2. Sand-fly colony maintenance 3. Detection of infection by immunological and molecular based methods	Insectorium, Spray pump, CDC light trap, Facilities for Bio-assay
6.	Microbiology 1. Leishmania culture and its preservation 2. *L. donovani* unresponsiveness	Laminar Flow, BOD-Incubator, Sterilizing facilities, Tissue culture, Liquid Nitrogen.
7.	Animal Care	Animal House having BALB/c mice, C57 black mice, Rabbits for research.
8.	Pathology 1. Services 2. Research on VL and PKDL	Clinical pathology, haematology, immunohistochemistry

9.	Epidemiology 1. Field survey 2. Study of VL risk factors 3. Early prediction of disease by simple and suitable tools	Trained person for disease surveillance and epidemiological study.

4.2.6.4. National / International Accreditations

The RMRIMR has recognized following accreditations:

1. External quality assessment/accreditation through Christian Medical College, Vellore for Clinical Biochemistry investigations (National Accreditation body for clinical biochemistry investigation.
2. Accreditation by WHO/IOWH for clinical trial studies.

4.2.6.5. National / International Certification

1. Certification from Christian Medical College, Vellore for clinical biochemistry investigations.
2. Certification by monitors of WHO/Institute of One World Health, USA to division of Clinical Medicine, Biochemistry and Pathology for clinical trial works.

4.2.6.6. Number of collaborations/ Affiliations

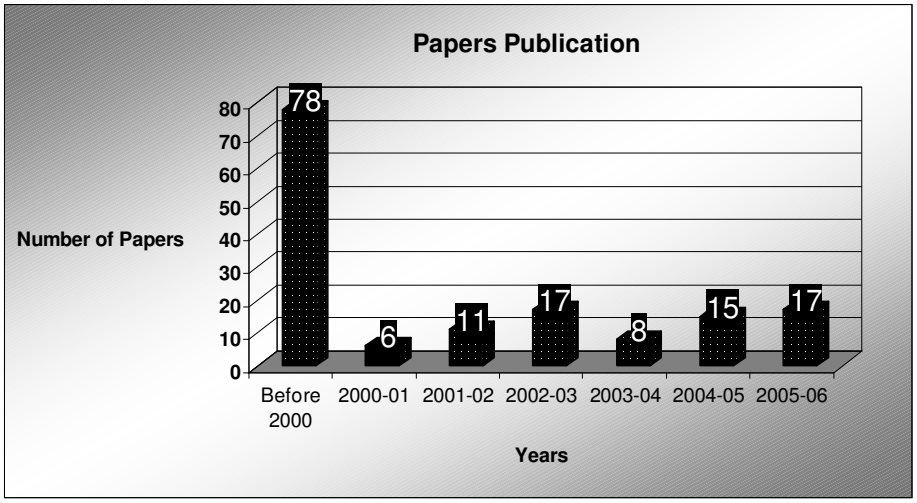
The RMRIMR has following collaborations:

S.NO	Collaborator	Number of Projects
1.	World Health	One
2.	WHO/TDR Geneva	Three
3.	Glaxo SmithKline	One
4.	European Union	One
5.	DBT	One
6	ICMR	One
7.	CDC Atlanta	One
8.	Indo German	One
9.	MSF Spain	One

4.2.6.7. Papers

The following figure 4.12 gives the details of the number of papers published by RMRIMR during 2000 and 2006:

Figure 4.12



(For details about the publications of RMRIMR, refer institute website)

4.2.6.8. Potential Exportable R & D services

RMRIMR has identified the following as their potential exportable R&D services:

a. Type of R & D services offered
    1. Testing
    2. Training
    3. Consultancy Services
    4. Surveys
    5. Studies
    6. Specialized facilities / services
    7. Clinical Trials
    8. Supply of information / Database

b. Description of R & D service offered
    1. Clinical biochemistry & pathology support in drug trials (includes drugs like Miltefosine (WHO / TDR / CMR / Zentaris), Paramomycine (iOWH, USA), Sitamaquine (Glaxo Smithkline).
    2. Vector Control
    3. Remote sensing
    4. Primary isolates, culture adaptation, cultivation and
    5. Preservation of *Leishmania* parasite.

6. New immunological diagnostics

c. Special or Unique features of R & D service offered

1. Developed a sensitive culture media for diagnosis of Kala-azar.
2. Slow release emulsified suspension of Malathion Spray (WHO/TDR).
3. Monitoring of DDT spray.
4. Techno-ecological vector control
5. Diurnal variation of L.D bodies

d. Whether R & D service offered exported in past? If yes, the client and value realized

1. Clinical trials for drug Miltefosine was approved for marketing as first ever-oral drug for treatment of Kala-azar for WHO / TDR / ICMR / Zentaris.

4.2.6.9. Target Markets

The following target markets have been identified for the above services:

S. No.	Competency	Countries
1.	Epidemiology and Clinical Medicine	USA, Australia, Thailand.
2.	Immunology	Switzerland; USA; Bangladesh.
3.	Molecular Biology	Italy.
4.	Pathology	UK
5.	Biochemistry	USA, Switzerland
6.	Social Science	Italy

4.2.6.10. Constraints & Suggestions

RMRIMR suggested that following could help in enhancing the capabilities for exporting R & D services:

Area	Suggestions
Molecular Biology	International exposure to Scientists
Immunology	International exposure to Scientists; International collaboration; increase in man power content

Clinical Bio-chemistry	More interaction with foreign countries
Clinical Medicine	International exposure to Scientists
Vector Control	International exposure to Scientists
Microbiology	International exposure to Scientists
Patient Care	To increase the hospital facilities
Animal Care	To further strengthen animal facilities for inbreeding, health monitoring as well as national and International exposure to Scientists.
Pathology	Regular training and international exposure.
Statistical Department	Increase in infrastructure facilities
Epidemeology	International exposure to Scientists

4.2.7 Vector Control Research Centre (VCRC), PONDICHERRY-NA

4.2.8 National Institute of Virology (NIV), PUNE

The Virus Research Centre (VRC), Pune came into existence in 1952 under the joint auspices of the ICMR and the Rockefeller Foundation, as a part of the global programme of investigations on the arthropod-borne group of viruses. In view of its expanded scope and activities, the VRC was redesignated as the National Institute of Virology (NIV) in 1978. The NIV is identified today as the WHO Collaborating Centre for arboviruses reference and haemorrhagic fever reference and research. NIV is also the National Monitoring Centre for Influenza, Japanese encephalitis, Rota, Measles and Hepatitis.

4.2.9 National AIDS Research Institute (NARI), PUNE

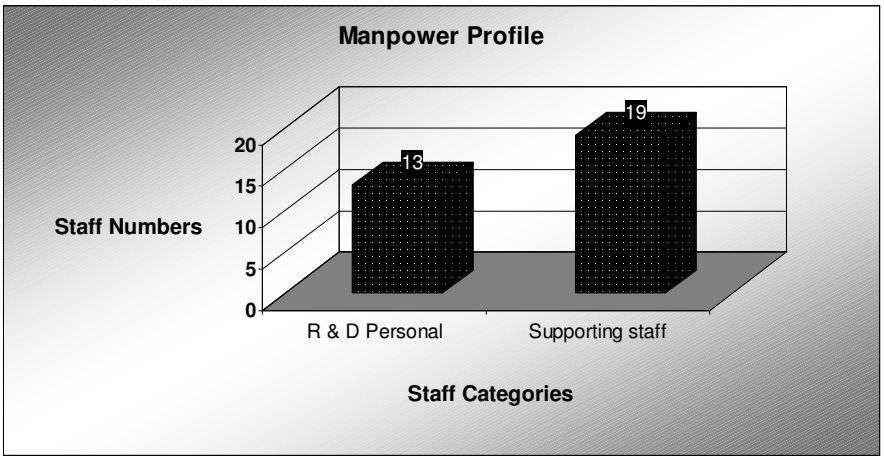
The National AIDS Research Institute (NARI) was established in 1992 with the mission to provide leadership in biomedical research on HIV/AIDS in India with an aim to compliment and strengthen the National AIDS Control Programmes. In order to accomplish this NARI brings together a multidisciplinary team of scientists in epidemiology, public health, cultural anthropology, infectious diseases, quantitative and qualitative methodology and biostatistics and other related fields. NARI's mission also includes basic behavioral and social science research in areas that must be understood to develop appropriate HIV preventive interventions suitable in countries such as India with various cultural, ethnic and community backgrounds.

NARI has isolated HIV-1 and HIV-2 strains of virus for characterization necessary for base-line work for future efforts towards development of AIDS vaccine using Indian viral strains. NARI has generated and followed a cohort of `at risk' HIV seronegative individual for estimation of incidence rates of HIV. The biological and behavioral risk factors have also been identified. Such cohorts are critical for any future intervention trials.

4.2.9.1. Manpower profile

The following figure 4.13 depicts the manpower profile of NARI

Figure 4.13



4.2.9.2. Areas of Core Competency

The following Table 4.13 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.13

S.No	Area	Manpower (Nos.)	
		R & D Personal	***Support staff***
1.	Clinical Science	3	1
2.	Epidemiology	3	5
3.	Immunology & Serology	2	7
4.	Virology & Molecular Virology	2	2
5.	Microbiology & Pathology	1	2
6.	Behavioural & Social Sciences	2	2

4.2.9.3. Major R&D Facilities

The following Table 4.14 gives various R&D facilities support the above areas of competency:

Table 4.14

S.No	Area & Facilities
1.	**Laboratories** There are 6 laboratories in NARI Main building which are well equipped to perform the following assays: **a) SEROLOGY** 1. HIV Testing by ELISA, Rapid, p24 antigen and Western Blot **b) MICROBIOLOGY** 1. Isolation, Identification, Antibiotic sensitivity & MIC for N. gonorrohoeae, H. ducreyi, Candida species, M. tuberculosis (Bactec) and Enteric Pathogens. 2. Serological tests-VDRL, TPHA, RPR, Toxoplasma, HBsAg, CMV, HCV HSV-II, Cryptococcal antigen detection tests. 3. Examination of stool samples for Enteric Parasites. 4. CT/NG, nucleic Acid Testing by PCR, Probe Tech and Gene Aptima. **c) CLINICAL PATHOLOGY** 1. Complete Blood Count with Differential 2. Urine analysis 3. Blood chemistry and serum electrolytes **d) IMMUNOLOGY** 1. Chromium Release Assay 2. ELISPOT 3. Cytokine Estimation 4. Lymphocyte proliferation assay 5. Immunophenotyping of lymphocytes **e) MOLECULAR VIROLOGY** 1. Virus isolation 2. Phenotypic characterization 3. Testing of various compounds and herbal products for anti-HIV activity. 4. Cell tropism 5. Co-receptor 6. Neutralization assay 7. Viral Load 8. DNA extraction and PCR 9. HMA 10. Cloning 11. Sequencing 12. Facility for studying anti-HIV drug resistance mutants.

2.	**Pharmacy** NARI Central Pharmacy is the main pharmacy that presently caters its services to seven clinics of NARI. The work activity is regular supply of primary care medicines to the clinics and procurement of these medicines as per requirement. In addition to the primary care medicines, NARI Central Pharmacy also participate in the antiretroviral clinical trials. The import of medicines and its distribution to the clinical trial pharmacies is also done be NARI Central Pharmacy. NARI Central Pharmacy also is involved in regular procurement (From US) and distribution of the gloves and vacutainers to the laboratories and clinics. The NARI Central Pharmacy is located in the NARI Main building. The area of the central pharmacy is about 200 sq feet. Communication facilities Telephone, Internet and Fax machine are available.
3.	**Data Management** The computational infrastructure consists of: 1. Local Area Network for connecting two buildings and around 150 nodes in the institute 2. ISDN line (128 kbps) and broadband line of 512 kbps for Internet and videoconference. 3. Data fax machines for data capture and data transfer 4. Facilities for backup and storage of large (about 20 GB) amount of data on tape drives 5. Antivirus and firewalls for server & nodes protection 6. Reprographic equipments like heavy-duty laser printers, scanner, photocopiers etc. exist in the main center as well as at satellite centers. 7. Trained personnel handling quality control & quality assurance of data. Communication facility Facility of video conferencing to carryout telemedicine training, face to face discussions, multipoint press conference and online meetings.
4.	**Clinical Sciences** The clinical sciences division of NARI has been operating through a network of 3 HIV referral clinics, 1 clinic dedicated to research on HIV prevention in women, 1 comprehensive health care clinic for sex workers, their children and their clients, Arogya Kendra and 2 clinics attached to Tuberculosis and Reproductive Tract Infections clinics of the Sassoon Hospital, Pune. These clinics provide specialized services like counseling, medical care for HIV/ AIDS, tuberculosis and other opportunistic infections, investigation and management of STI's and referral services.

5.	**Epidemiology** The highlights of Division of Epidemiology are the first cohort study on HIV discordant couples, clinical trials and acceptability studies of vaginal microbicides and the initiation of the first AIDS vaccine trial in India.
6.	**Behavioural and Social Sciences** Development of education material for adolescents and field-testing of the models. Emphasis placed on strengthening community participation in the research through Community Advisory Board and community involvement plan.

4.2.9.4. National / International Certifications

The NARI has recognized following certifications:

1. CAP (College of American Pathologists), USA
2. Virology Quality Assurance (VQA), USA
3. Virology Quality Assurance (VQA), UK
4. Virology Quality Assurance (VQA), NHLS
5. Virology Quality Assurance (VQA), South Africa
6. Johns Hopkins Hospital (JHU),USA

4.2.9.5. Number of collaborations/ Affiliations

The NARI has following collaborations:

National collaborations

1. NACO
2. IRR, Mumbai
3. MSACS
4. BJMC, Pune
5. DBT
6. ICMR Centres

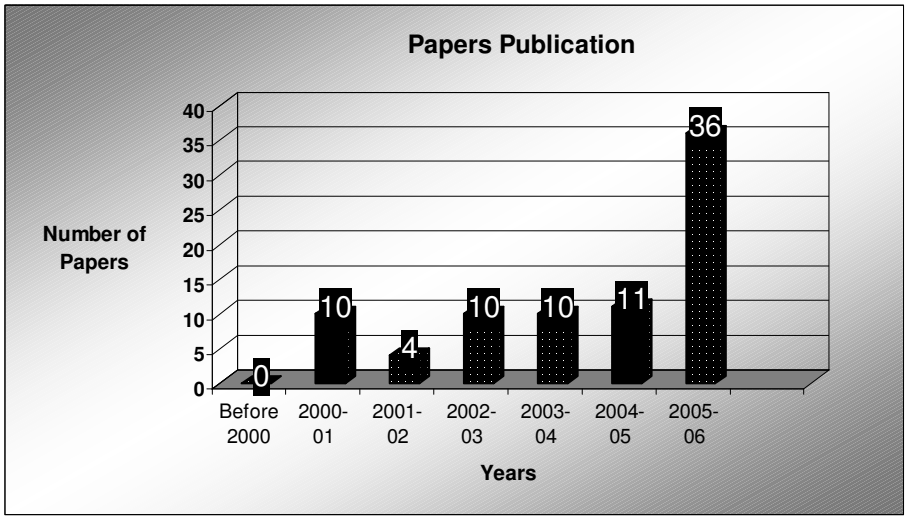
International collaborations

1. Johns Hopkins University (JHU)
2. Family Health International (FHI)
3. WHO (World Health Organization)
4. IAVI (International AIDS Vaccine Initiative)
5. French –MTCT (Mother to child transmission)
6. YALE University, USA
7. CONRAD (Contraceptive and Research Development Program), USA
8. AACTG (Adult AIDS Clinical Trial Group), USA
9. University of California at San Diego [UCSD], USA

4.2.9.6. Papers

The following figure 4.14 gives the details of the number of papers published by NARI during 2000 and 2006:

Figure 4.14



(For details about the publications of NARI, refer institute website)

4.2.9.7. Potential Exportable R & D services

NARI has identified the following as their potential exportable R&D services:

1. Testing
2. Training
3. Consultancy Services

4. Surveys
5. Specialized facilities/services
6. Clinical Trials

4.2.9.8. Constraints

NARI highlighted inadequate market capabilities, Bureaucratic bottlenecks, Competitiveness of services as the constraints that they faced in providing R & D services in India as well as abroad.

4.2.10 National Institute of Cholera and Enteric Diseases (NICED), KOLKATA

National Institute of Cholera and Enteric Diseases" (NICED) was established in 1979. The unique feature of this Institute is that it conducts basic research and applied clinical and epidemiological research on diarrhoeal diseases under the same roof. This Institute has its basic science set up with well equipped, modern technological facilities in different disciplines such as bacteriology, virology, parasitology, biochemistry, pathophysiology, molecular biology, electron microscopy, immunology and vaccine development. Clinical Division of this Institute has set up units at two different state hospitals, viz. Infectious Diseases Hospital and Dr. B.C. Roy Memorial Hospital for Children. Collaborative research programmes are also being conducted in other state hospitals like S.S.K.M. Hospital, Calcutta Medical College and Hospital, N.R.S. Medical College and Hospital. The Institute has its own selected field areas for epidemiological studies in semi-urban and rural areas near Calcutta. Research activities of different divisions are supported by the Instrument and Equipment section, Media section and Animal House section. A well-maintained library with large number of texts and reference books and a wide collection of leading national and international journals with online facilities add strength to the Institute.

Though this Institute is principally financed by the Indian Council of Medical Research (ICMR), New Delhi, different national and international funding agencies extend support to the Institute on specific research projects.

The Japanese International Co-operative Agencies (JICA) has financed a technical collaborative research with this Institute to conduct research molecular aspects of different enteropathogens with special emphasis on Vibrios. Under the JICA-NICED exchange programme, Japanese scientists are working in this Institute and scientists and technical persons of this Institute are also receiving training in advance Japanese laboratories. Department of Biotechnology (DBT), Government of India DST, CSIR, Ministry of Environment, etc. support several projects on basic research. The WHO and UNICEF also provide assistance on applied research.

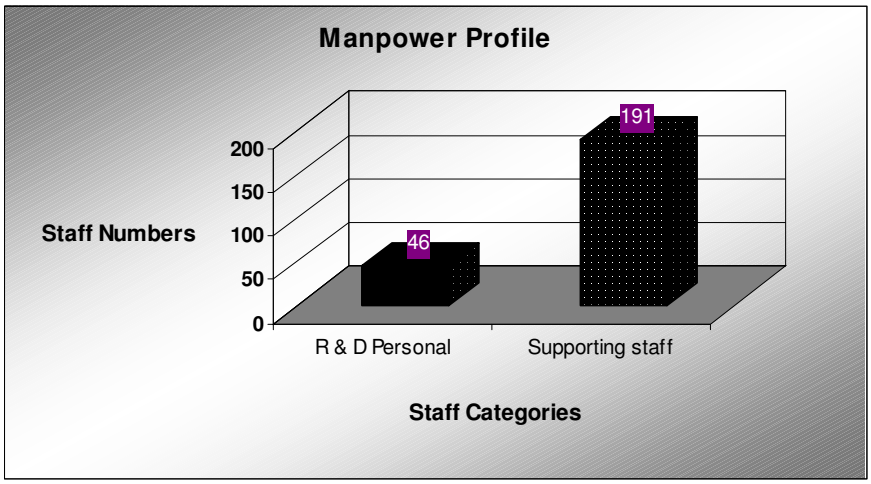
Several workshops on management and preventive aspects of diarrhoeal diseases are sponsored by WHO, UNICEF and Ministry of Health and Family Welfare, Govt. of India. These national and international workshops are conducted at the Institute and also in different parts of India involving doctors of State Health Services and international participants. Several workshops sponsored by WHO, DBT on rapid screening methodology for detection of different enteropathogens are also conducted in this Institute, at regular intervals.

Each year 4-5 post-graduate students of this Institute get Ph.D. degree from different Universities in the state (Calcutta University, Jadavpur University, Kalyani University, Burdwan University, Viswa Bharati University). Post-graduate medical students also attend courses at the Institute for training on diarrhoeal diseases and scientists act as co-guides for M.D. students for thesis work. WHO and JICA also send international fellows to receive training on diarrhoeal diseases.

4.2.10.1. Manpower profile

The following figure 4.15 depicts the manpower profile of NICED

Figure 4.15



4.2.10.2. Areas of Core Competency

The following Table 4.15 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.15

S.No	Area	Manpower (numbers)	
		R&D personnel	Supporting staff
1.	Diarrhoeal diseases research	34	156
2.	Typhoid fever	5	15
3.	Helicobacter pylori infection	2	6
4.	Infective hepatitis	1	4
5.	HIV/AIDS	4	10

4.2.10.3. Major R&D Facilities

The following Table 4.16 gives various R&D facilities support the above areas of competency:

Table 4.16

S.No	Area	Facilities
1.	Diarrhoeal disease research	1. Hospital facilities for clinical trials 2. Rural and urban field area for epidemiological studies 3. High standard laboratories for basic research e.g. molecular epidemiology of bacterial pathogens, hybridoma facilities, DNA sequencing, transgenic animal facilities, electron microscopy, immunology for attempt of vaccine development

4.2.10.4. Patents

The following Table 4.17 gives the details of the number of patents applied by and granted to NICED during 2000-01 to 2004-05.

Table 4.17

Year	Applied in India	Granted Foreign
Prior to 2000 which are still active		Live oral cholera vaccine VA 1.3 patented in Europe No. 973099578-2105n in 1998
2004-05	Applied for patent "A process for preparation of holey/ lacey film"	

4.2.10.5. National / International Certification

The NICED has following certifications:

1. WHO Collaborating centre for research & training on Diarrhoeal diseases.
2. WHO Collaborating centre for Vibrio cholerae phage typing.
3. National HIV reference centre.

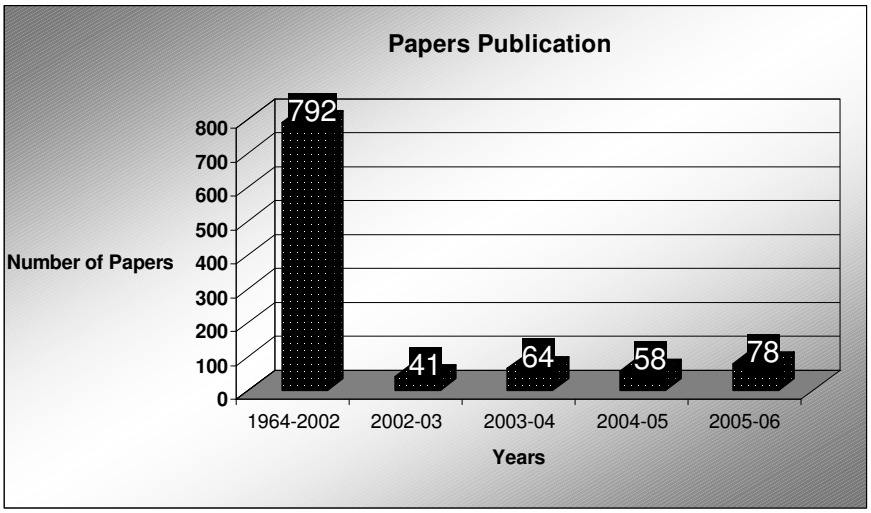
4.2.10.6. Number of collaborations/ Affiliations

The NICED has 34 collaborations/affiliations for various projects

4.2.10.7. Papers

The following figure 4.16 gives the details of the number of papers published by NICED during 2000 and 2006:

Figure 4.16



(For details about the publications of NICED, refer institute website)

4.2.10.8. Potential Exportable R & D services

NICED has identified the following as their potential exportable R&D services:

a. Type of R & D services offered

1. Testing
2. Training
3. Consultancy Services
4. Surveys
5. Studies
6. Contract research
7. Technology Transfer
8. Clinical Trials
9. Supply of information/database

b. Description of R & D service offered

Manpower development:

1. Ph.D. programme for the universities like Kolkata, Jadavpur, Kalyani, Burdwan, Vidyasagar,
2. Summer training programme for M.Sc. Microbiology and Biotechnology students of different universities of all over India.
3. Trained graduate and postgraduate medical students of different medical colleges.
4. Offer training for medical personnel (National)
    i. Clinical management of diarrhoeal diseases.
    ii. Epidemiological aspects of diarrhoeal diseases.
    iii. Molecular epidemiology of diarrhoeal pathogens.
    iv. Drinking water quality monitoring.
5. Paramedical staff (National)
    i. Diagnostic aspects of diarrhoeal pathogen (bacterial, viral parasites)
    ii. Screening of HIV/ AIDS
6. Training of medical personnel (International)
    i. Molecular epidemiology of diarrhoeal pathogens for the doctors of Japan
    ii. Molecular epidemiology of diarrhoeal pathogens for the medical students of Japan
    iii. Clinical management of tropical diseases for German doctors
    iv. Molecular epidemiology of diarrhoeal pathogens with special reference to cholera for the medical doctors of 3rd country e.g., Nepal, Bhutan, Bangladesh, Sri Lanka, Thailand, Indonesia, China, Zambia, Ghana etc.
7. Identification and molecular characterization of different bacterial strains causing diarrhea from different parts of India.
8. Phage typing of cholera strains received from different parts of India
9. Screened blood samples for HIV/ AIDS received from different Govt. institutes of West Bengal
10. Testing and evaluation of HIV/ AIDS kits
11. WHO fellow (national and international) received training.

c. Special or Unique features of R & D service offered

1. Research on applied and basic sciences related to diarrhoeal diseased, typhoid fever, infective hepatitis, helicobacter pylori infection and HIV/ AIDS
2. Training programme for medical and paramedical personnel in clinical management and diagnostic aspects.

d. Whether R&D service offered exported in past: if yes, the client and value realized

Training

1. Molecular epidemiology of diarrhoeal pathogens for the doctors of Japan
2. Molecular epidemiology of diarrhoeal pathogens for the medical students of Japan
3. Clinical management of tropical diseased for German doctors
4. Molecular epidemiology of diarrhoeal pathogens with special reference to cholera for the medical doctors of 3rd world countries e.g., Nepal, Bhutan, Bangladesh, Sri Lanka, Thailand, Indonesia, China, Zambia, Ghana etc.

4.2.10.9. Target Markets

The following target markets have been identified for the above services:

S.No	Area	Countries
1.	Diagnostic aspects of diarrhoeal diseased	Japan, Nepal, Bhutan, Bangladesh, Sri Lanka, Thailand, Indonesia, China, Zambia, Ghana.
2.	Clinical management of diarrhoeal diseases	Germany, Japan, Nepal, Bhutan, Bangladesh, Sri Lanka, Thailand, Indonesia, China, Zambia, Ghana.

4.2.10.10. Constraints

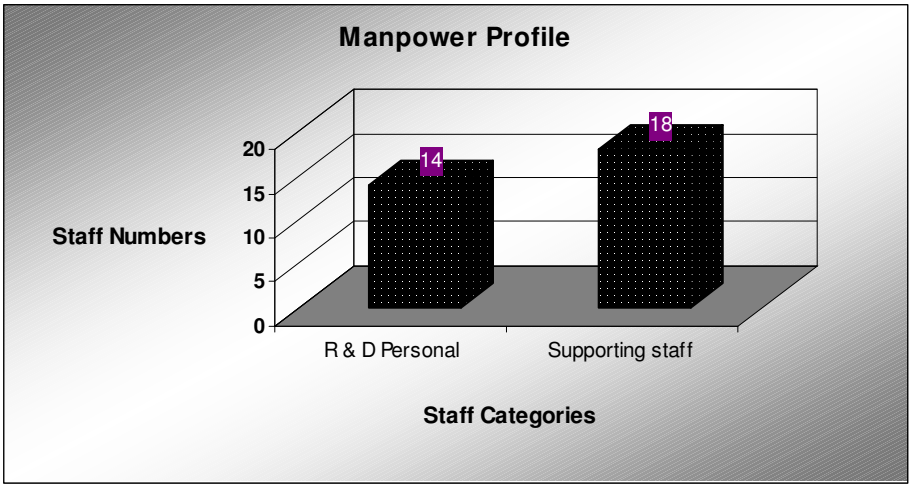
NICED highlighted Bureaucratic bottlenecks, National regulations as the constraints that they faced in providing R & D services in India as well as abroad.

4.2.11 Regional Medical Research Centre, Dibrugarh

4.2.11.1. Manpower profile

The following figure 4.17 depicts the manpower profile of RMRC, Dibrugarh

Figure 4.17



4.2.11.2. Areas of Core Competency

The following Table 4.18 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.18

S.No	Area	Manpower (Nos.)	
		R & D Personal	Support staff
1.	Mosquito borne diseases	6	7
2.	HIV & Drug abuse	2	2
3.	Trematode infection	2	3
4	Haemaglobinipathy	1	3
5.	Cancer Nasopharynx, Osophagus Stomach	1	1
6.	Cardio vascular disease	2	2

4.2.11.3. Major R&D Facilities

The following Table 4.19 gives various R&D facilities support the above areas of competency:

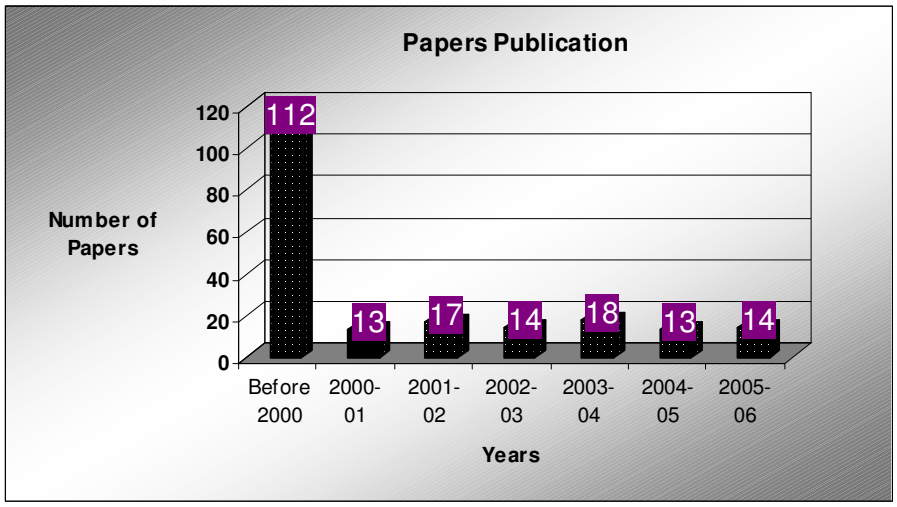
Table 4.19

S.NO	Area	Facilities
1.	Genomic and pesteonomic	PCR,PFGE, 2-D etertophorasis, Protein purification ,DNA Sequencing
2.	Haematological studies	Cell counter, Flowcytometer
3.	Biochemical studies	Auto analyzer, Spectrophotometer , HPLC, Ion Chromatograph, Flurometer, Flurorescet, phase contrast etc.
4.	Microscopic Studies	Flurorescet, Phase contrast etc
5.	Virology	Tissue culture
6.	Bacteriology/Mycology	Bectech system, Isolation , Identification, Drug sensitivity
7.	Parasitology	Parasite culture, Identification ,Genomic work
8	Epedemilogy	Computer, V-SAT,Internet
9.	Animal house	Experimentation facility, Experimental model Development

4.2.11.4. Papers

The following figure 4.18 gives the details of the number of papers published by RMRC, Dibrugarh during 2000 and 2006:

Figure 4.18



(For details about the publications of RMRC, Dibrugarh, refer institute website)

4.2.11.5. Potential Exportable R & D services

RMRC, Dibrugarh has identified the following as their potential exportable R&D services:

Type of R & D services offered

1. Testing
2. Training
3. Consultancy Services
4. Surveys
5. Studies
6. Contract research (Bioassay of Molecules)
7. Technology Transfer
8. Specialized facilities/ services
9. Clinical Trials
10. Supply of information/database

4.2.11.6. Target Markets

The following target markets have been identified for the above services:

S. No.	Competency	Countries
1.	Training in vector borne diseases	SAARC and south east Asian countries
2.	Diagnostic kit for paragoniamisis	
3.	Animal model and drug testing for paragonimiasis	

4.2.11.7. Constraints

RMRC, Dibrugarh highlighted Marketing Policies of laboratory, Lack of Market information and inadequate marketing capabilities as the constraints that they faced in providing R&D services in India as well as abroad.

4.2.12 Regional Medical Research Centre, Port Blair

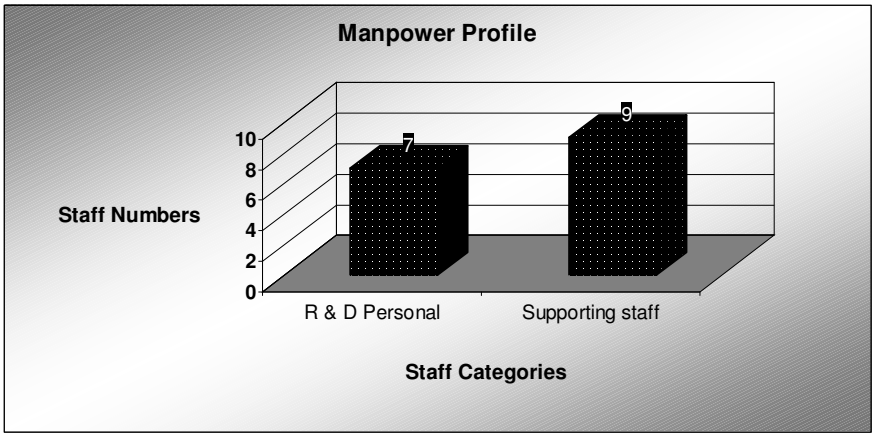
The Regional Medical Research Centre, Port Blair situated at Port Blair in Andaman & Nicobar Islands, the Regional Medical Research Centre, a permanent institute of the Indian Council of Medical Research, conducts research on diseases and health related topics relevant to Andaman & Nicobar Islands with special emphasis on the health problems of indigenous primitive tribes.

Leptospirosis is the thrust area of research and the Centre has been designated as the National Reference Centre for Leptospirosis in India and also been desiganted as WHO Colloborative Centre for Diagnosis, Reference, Research and Training in Leptospiosis. The institute also conducts biomedical research on locally prevalent communicable and non-communicable diseases with special reference to the health problems of primitive tribes and develops technical manpower locally.

4.2.12.1. Manpower profile

The following figure 4.19 depicts the manpower profile of RMRC, Port Blair

Figure 4.19



4.2.12.2. Areas of Core Competency

The following Table 4.20 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.20

S.No	Area	Manpower (Nos.)	
		R & D Personal	Support staff
1.	Epidemiology	2	5
2.	Microbiology	1	2
3.	Molecular Biology	3	1
4	Entomology	1	1

4.2.12.3. Major R&D Facilities

The following Table 4.21 gives various R&D facilities support the above areas of competency:

Table 4.21

S.NO	Area	Facilities
1.	Molecular Biology	Genetic studies, Gene cloning and expression, gene sequencing, protein purification, molecular diagnostics, molecular characterization of pathogens.
2.	Immunology	Development of Diagnostics

4.2.12.4. National / International Accreditations

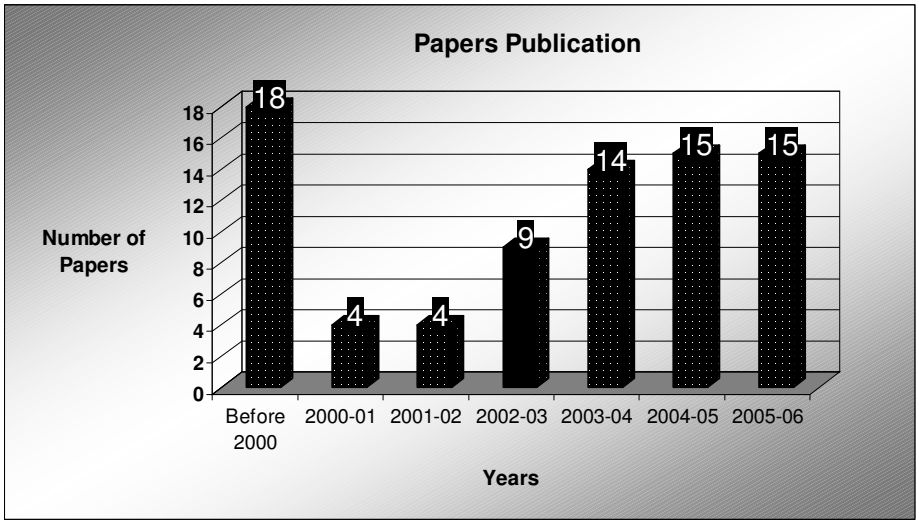
The RMRC, Port Blair has accreditation from WHO Collaborating centre for diagnosis, reference research and training in leptospirosis.

4.2.12.5. Number of collaborations/ Affiliations - *One*

4.2.12.6. Papers

The following figure 4.20 gives the details of the number of papers published by RMRC, Port Blair during 2000 and 2006:

Figure 4.20



(For details about the publications of RMRC, Port Blair refer institute website)

4.2.12.7. Potential Exportable R & D services

RMRC, Port Blair has identified the following as their potential exportable R&D services:

1. Testing
2. Training
3. Consultancy Services
4. Surveys
5. Studies
6. Clinical Trials
7. Supply of information/database

4.2.12.8. Constraints

RMRC, Port Blair highlighted Lack of Market information, Inadequate marketing capabilities as the constraints that they faced in providing R & D services in India as well as abroad.

4.2.13 Regional Medical Research Centre, Bhubaneswar

The Regional Medical Research Centre, Bhubaneswar was created in 1981 and its objectives, thrust areas of research and linkages with State Governments were outlined in the Project Committee Report of 1981. Objectives as they are evolved over the years are given above under item-1. Initially, the Centre was operating from a rented building and administration was looked after by the Director, TRC, Chennai. Subsequently the laboratories were housed in the Drug Testing Laboratory (DTL), Government of Orissa, Bhubaneswar for some years while the building of RMRC, Bhubaneswar were coming up at Chandrasekharpur. The RMRC, Bhubaneswar laboratories were shifted to its permanent buildings in 1990.

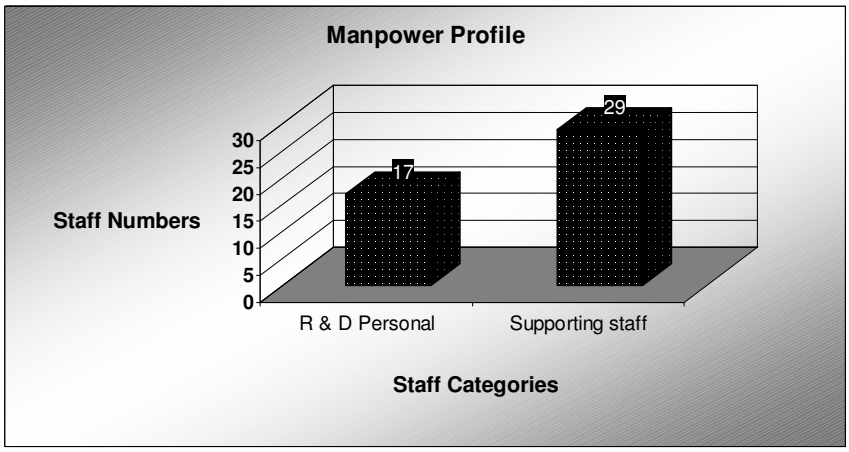
Dr. S.P. Tripathy, Director, TRC, Chennai was the founder Director for RMRC, Bhubaneswar from 1981-82. Dr. L.N. Mohapatra, Ex-Dean of AIIMS, New Delhi was the Director from June 1985 to February 1990. He was succeeded by Brig. (Dr.) M.S.Dash for a period of one year as the Officer-Incharge. Dr.K.A.V.R. Krishnamachari was the Director for about one and half years from the middle of

1991. Dr. K. Satyanarayana took charge as the Director in May 1993 and is continuing.

4.2.13.1. Manpower profile

The following figure 4.21 depicts the manpower profile of RMRC, Bhubaneswar

Figure 4.21



4.2.13.2. Areas of Core Competency

The following Table 4.22 gives the available manpower data in the identified areas of core competency of the institute.

Table 4.22

S.No	Area	Manpower (Nos.)	
		R & D Personal	Support staff
1.	Immunobiology of filariasis, malaria& other nematodoes to develop diagnostics and vaccines.	5	6
2.	Designing & conducting clinical and epidemiological studies &clinical drug trials in areas of filariasis, malaria and other regional health problem.	6	11
3.	Strategic and operational research towards control/elimination of filariasis, micronutrient malnutrition and other regional health problems.	6	12

4.2.13.3. Major R&D Facilities

The following Table 4.23 gives various R&D facilities support the above areas of competency:

Table 4.23

S.NO	Area	Facilities
1.	Immunobiology of filariasis, malaria & other nematodoes to develop diagnostics and vaccines.	Fluocytometer, Micro plate reader, B-gamma counter, Micro-array PCR.
2.	Designing & conducting clinical and epidemiological studies &clinical drug trials in areas of filariasis, malaria and other regional health problem.	Scientist & technical manpower, Field units, Computer facility, Collaboration with local health departments.
3.	Strategic and operational research towards control/elimination of filariasis, micronutrient malnutrition and other regional health problems.	Technical manpower, Field units, Laboratory methods for IDD, HB disorder, Malnutrition.

4.2.13.4. National / International Accreditations - *One*

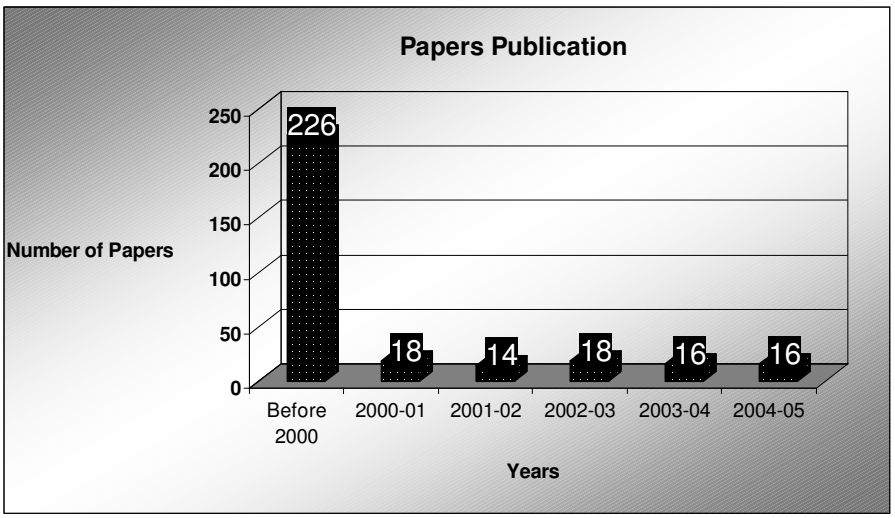
4.2.13.5. National / International Certification – *One*

4.2.13.6. Number of collaborations/ Affiliations – International -5, National-12

4.2.13.7. Papers

The following figure 4.22 gives the details of the number of papers published by RMRC, Bhubaneswar during 2000 and 2006:

Figure 4.22



(For details about the publications of RMRC, Bhubaneswar refer institute website)

4.2.13.8. Potential Exportable R & D services

RMRC, Bhubaneswar has identified the following as their potential exportable R&D services:

a. Type of R & D services offered
    1. Testing
    2. Training
    3. IPR services
    4. Technology Transfer

b. Description of R & D service offered:
    1. Training of Ph.D students.
    2. Training to M.Sc, Microbiology students.
    3. Short-term training on filarial/malaria to local doctors.
    4. Organizing international /national level workshop.

c. Special or Unique features of R & D service offered
    1. Tests for Sickling disorders, filarial, Malaria, IDD, Hepatitis.