# ASSESSING BURDEN OF RABIES IN INDIA

## WHO SPONSORED

## NATIONAL MULTI-CENTRIC RABIES SURVEY 2003

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# FINAL REPORT

## MAY 2004

## AGENCY


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This survey is a
collaborative effort of

- **Association for Prevention and Control of Rabies in India (APCRI)**

and

- **Commonwealth Veterinary Association (CVA)**
- **Centre for Research in Health and Social Welfare Management**

*conducted with the support and participation of*

- **National Institute of Communicable Diseases**
- **National Institute of Mental Health and Neurosciences**
- **Central Research Institute**
- **Pasteur Institute of India**
- **Indian Veterinary Research Institute**
- **21 Medical Colleges**
- **18 Veterinary Colleges**
- **Directorates of Health, Animal Husbandry of Islands of Andaman & Nicobar and Lakshadweep**

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WORLD HEALTH ORGANIZATION
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## REPORT OF THE BURDEN OF RABIES STUDY IN INDIA CONDUCTED BY APCRI

### PREFACE

Rabies is an important public health problem in South East Asia contributing to about 70% of the global burden. Globally and regionally, India accounts for the highest annual rabies mortality previously estimated to be 30,000-50,000 deaths per year. This estimate has been used for the past 15 years.

Though rabies is vaccine preventable, it has not received the priority or the resources required. WHO has been advocating the need to accord greater priority to rabies and the need for systematic surveys in endemic countries to obtain a more accurate estimate of human rabies deaths and animal bites. WHO considered such a survey as a pre-requisite to developing appropriate Plans of Action for Rabies Control. In order to achieve this task in India, WHO selected the Association for Prevention and Control of Rabies in India (APCRI) to conduct a National Multi Centric Rabies Survey to assess the rabies burden in India. APCRI was selected because it has a country wide network of branches and a large pool of experts and public health specialists as members.

The survey was conducted country-wide in collaboration with 22 medical colleges, 18 veterinary colleges and five National Research Centres. I congratulate and thank APCRI for successfully conducting the survey, using a well-defined methodology and completing the survey within the scheduled time-frame.

The results of the survey put the annual human rabies deaths in India at 18,000-20,000 deaths, a figure which is less than the previously estimated one, but the incidence of animal bites in the surveyed population is very high. The findings of the survey were reviewed by a core group of experts from NICD and WHO and this final report incorporates the inputs and suggestions from the core group.

I am confident that this report would be well received by the national authorities and would serve as a reference for developing effective action plans for the control of rabies at the Central and State levels in India.

Dr S. J. Habayeb
WHO Representative to India

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# BACKGROUND

### WHO-SUPPORTED BURDEN OF RABIES STUDY IN INDIA CONDUCTED BY APCRI

The WHO Steering Committee for Rabies Control in Asia, at its meeting in June 2002, recommended a re-assessment of the public health burden of rabies in India, since the estimated figure of 30 000 deaths per year, needed to be reviewed. At the end of 2002, the WHO Regional Office for South East Asia, in consultation with WHO India office, proposed Association for Prevention and Control of Rabies in India (APCRI) as a suitable agency to conduct the study. WHO-Geneva endorsed the Regional Office proposal. In early 2003, WHO-SEARO executed an Agreement for Performance of Work (APW) with APCRI and signalled the launch of the study.

APCRI was requested to provide a draft protocol of the study, with the main objective to assess the rabies mortality estimate for India. The study also aimed at providing additional information on rabies such as animal bite rate per 100 000 population, post exposure treatment availability and costs and some information on animal rabies. A protocol was prepared by APCRI for WHO evaluation. Very quickly, an agreement was reached on the methodology of a multi-centric survey involving 20 Medical Colleges and as many Veterinary colleges, distributed all over India. A meeting of the Principal Investigators (PIs) was organized during the first quarter of 2003 by APCRI at Bangalore, with WHO participation from Hq, Regional and India offices and a WHO expert on rabies from The Philippines.

The study was conducted very efficiently during March-May 2003. The draft report was delivered to WHO in early July 2003, on the occasion of the APCRI meeting held in Bubaneswhar, Orissa. The final draft report was reviewed by a Core Group of Rabies experts from India and WHO at the WHO Regional Office in New Delhi, at the end of November 2003. The Core group reviewed the report and suggested appropriate changes. The final report incorporating all the changes proposed by the experts was submitted to WHO in February 2004.

The results of the APCRI study and report are fully in line with the data provided by a model developed by WHO in 2003 to re-assess the burden of rabies in Asia and Africa, which is submitted to the WHO Bulletin early in 2004. The Principal Investigator and the Coordinator of the study-Dr M.K.Sudarshan and his team deserve appreciation for conducting the study in a efficient and systematic manner, within the scheduled time-frame.

This report is the product of the excellent coordination and collaboration that was established between APCRI and WHO - Headquarters, Regional and Country Offices. We are looking forward to its publication.

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# FOREWORD

Rabies in India has been a disease of low public health priority both in the medical and veterinary sectors. The disease is mostly affecting the poor, who are voiceless and disorganized and the dog, mostly responsible for the disease is not an animal of economic importance. Besides dog is greatly loved, protected by vast majority of people based on compassion and non-violence and more so because of its proven unstinted loyalty to its master. There has also been a surge of animal rights activism in the recent past in the country with a vociferous support even from political quarters. The recent judgement of Supreme Court of India (2002) directing Government of India to phase out sheep brain vaccine is a positive development. Consequently, Government of India, through ICMR is now conducting a feasibility study on intradermal rabies vaccination.

However, according to WHO (2002) India officially reported 30,000 human rabies deaths (an estimated figure, which has remained constant since 1990) and it accounts to 60% of global report of 50,000 deaths annually. Due to lack of any surveillance and proper reporting there is no report on current situation of rabies in India. Hence, at the behest of WHO & GOI, APCRI, a registered scientific society was entrusted this task of doing a National Rabies Survey in 2003. APCRI, in collaboration with Commonwealth Veterinary Association and Centre for Research in Health and Social Welfare Management, with technical and professional guidance from NICD, PIIC, NIMHANS, others and involving medical and veterinary institutions has conducted this survey. The survey was done in an adequate representative sample population and covering different regions of the country.

It is sincerely hoped that the results of this survey is used by Government of India and WHO for the benefit of the people. As it is envisioned to make India a developed nation by 2020 and for its accomplishment it is very pertinent to make India a Rabies Free Country by then.

M. K. Sudarshan

Bangalore
May 2004

**M. K. SUDARSHAN**
Chief Investigator & Past President
(1998-2003), APCRI

# ACKNOWLEDGEMENT

The APCRI committee of the national rabies survey gratefully acknowledges the technical and financial support provided by WHO. The help and guidance provided by Drs. F. X. Meslin, Geneva; D. Lobo, SEARO, Delhi; Betsy Miranda, Manila, Philippines and Dr. K. Ravikumar, Delhi were invaluable. The technical support and guidance provided by the steering committee of WHO and other international experts who have reviewed the survey at different times is sincerely acknowledged.

The support to the medical survey provided by the Deans, HODs of Community Medicine, Principal Investigators and their team, the Staff of Hospitals and Health Centres in the states were of great merit. Likewise the Deans and HODs of Pathology of Veterinary Colleges who provided the data on rabies in animals are sincerely thanked. The survey in the rabies free areas of Islands of Andaman & Nicobar and Lakshadweep was possible because of the full support and help provided by the Directors of Health and Veterinary services of the islands.

The overall support and guidance provided by the premier institutions of the country viz. NICD, CRI, PIIC, NIMHANS, ICMR, IVRI, and others is sincerely acknowledged. The professional help provided by the collaborating organizations viz. Commonwealth Veterinary Association and Centre for Research in Health and Social Welfare Management was very valuable.

Lastly, the office bearers, committee members, advisory board, the life members, corporate associates and other well-wishers of APCRI are sincerely thanked for all the cooperation and help provided during the entire study.

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# LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| APCRI | Association for Prevention and Control of Rabies in India |
| ABC | Animal Birth Control |
| ARV | Anti Rabies Vaccine |
| CHC | Community Health Center |
| CRI | Central Research Institute |
| CSSM | Child Survival and Safe Motherhood |
| CVA | Commonwealth Veterinary Association |
| DHS | Directorate of Health Services |
| EPI | Expanded Programme of Immunization |
| ERIG | Equine Rabies Immunoglobulin |
| FAT | Florescent Antibody Test |
| FMD | Foot and Mouth Disease |
| GOI | Government of India |
| HC | Health Center |
| HDCV | Human Diploid Cell Vaccine |
| HOD | Head of Department |
| HRIG | Human Rabies Immunoglobulin |
| IAH & VB | Institute of Animal Health and Veterinary Biologicals |
| ICDS | Integrated Child Development Services Scheme |
| ICMR | Indian Council of Medical Research |
| IGMC | Indira Gandhi Medical College |
| IMA | Indian Medical Association |
| INHS | Indian Naval Health Services |
| IVRI | Indian Veterinary Research Institute |
| KIMS | Kempegowda Institute of Medical Sciences |

| | |
|---|---|
| LAMA | Left Against Medical Advise |
| MO | Medical Officer |
| NICD | National Institute of Communicable Diseases |
| NIMHANS | National Institute of Mental Health and Neurosciences |
| NTV | Nerve Tissue Vaccine |
| PCEC | Purified Chick Embryo Cell |
| PHC | Primary Health Center |
| PI | Principal Investigator |
| PIIC | Pasteur Institute of India, Coonoor. |
| PVRV | Purified Verocell Rabies Vaccine |
| RCH | Reproductive and Child Health |
| RDDL | Regional Diseases Diagnostic Laboratory |
| RHTC | Rural Health Training Center |
| RIG | Rabies Immunoglobulin |
| SC | Steering Committee |
| SE | Standard Error |
| SEARO | South East Asia Regional Office |
| SPSS | Statistical Package for Social Sciences |
| TCV | Tissue Culture Vaccine |
| UIP | Universal Immunization Programme |
| UNICEF | United Nations Children's Fund |
| WHO | World Health Organization |

# GLOSSARY OF TERMS

| | |
|---|---|
| Aerophobia | Fear of fresh air, a pathognomonic sign of rabies. |
| Anganawadi worker | Primary health care worker (female) in the ICDS programme. |
| Community dog | A dog without a single owner and cared by the community. |
| Community informant | A person from the local community who provided information in the extended community search. |
| Community search | A community based enquiry into the events as relevant to the survey. |
| Confirmed case (Rabies) | A suspected human rabies case that is laboratory confirmed. |
| Exposed | A person who had a close contact (usually a bite or scratch) with a laboratory confirmed rabid animal. |
| Extended Community search | A community based enquiry into the human rabies cases based on the index case obtained from the health care establishment, this search could extend into the adjacent communities. |
| Geoscatter | A method ensuring adequate representation to the geographic diversity. |
| Household | A dwelling where a family or a group of people reside and eat from the same kitchen. |
| Hydrophobia | Fear of water, one of the classical pathognomonic sign of human rabies. |
| Indigenous treatment | A recourse resorted to treatment from non-allopathic systems or quacks. |
| Left against medical advice | A situation where the attendants of the human rabies case take away the patient from the hospital to home against medical advice on knowing the prognosis. |

| | |
|---|---|
| Municipal Corporation | Local self-government. |
| Out layers | Cases identified in populations that are abnormally high and hence were excluded from analysis due to possibility of errors. |
| Pet dog | A dog owned by an household. |
| Photophobia | Fear of light, a classical pathognomonic sign of human rabies. |
| Possibly exposed | A person who had close contact (usually a bite or scratch) with a rabies - susceptible animal in (or originating from) a rabies - infected area. |
| Probable case (Rabies) | A suspected human rabies case plus history of contact with suspected rabid animal. |
| Rabies contagion | An index of number of human rabies cases to the number of exposures. |
| Reservoir | Any person, animal, arthropod, plant, soil or substance (or combination of these) in which an infectious agent lives and multiplies, on which it depends primarily for survival. |
| Schedules | Survey instruments used to collect information. |
| Stray dog | An ownerless dog, free roaming and not cared by any household in a community. |
| Suspect case (Rabies) | A human rabies case that is compatible with clinical description. |
| Verbal autopsy | An enquiry by the investigators at the household level to gather information of the human rabies death. |
| Ward | A geographical demarcation based on population in urban areas. |
| Zone | A geographical demarcation based on population in urban areas, this contains many wards. |

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# EXECUTIVE SUMMARY

The present survey was done by APCRI with the aim of providing a comprehensive data on rabies and its related aspects in the human and animal populations in India. The specific objectives were to estimate the annual incidence of animal bites and human rabies deaths; to know the animal bite management practices, the common animal reservoirs of rabies and the time trends of disease in human and animal populations in the last decade.

The survey mainly had 3 components viz.

**1. Medical:** Twenty-one Medical Colleges with geoscatter distribution of the country were identified. In each medical college, the survey was done under a Principal Investigator (with minimum MD qualification) with the help of 3 to 4 medical postgraduates/interns with aptitude for survey work. The Principal Investigators were trained in a One-day Workshop on 24th February 2003 at APCRI HQs, KIMS, Bangalore. The Departments of Community Medicine, of 21 medical colleges did the community based household survey covering a total of 8500 households (2194 urban and 6306 rural) from 84 randomly chosen communities (21 urban and 63 rural @ 1 urban and 3 rural for each medical college) and cases of animal bites and their management information was obtained. The total population covered was 52,731 (as against a target population of 40,000 at 90% confidence level and 10% permissible error). Also information about pet/household dog and cat and aspects of their care was enquired. Additionally, data about hospital incidence of human rabies was obtained from the isolation hospitals of the medical colleges for the last 10 years (1992-2001).

Besides, the medical colleges (Each medical college to search atleast 500,000 population viz. 125,000 urban and 375,000 rural) covered about 10.8 million population (as against a target of 10 million population at 90% confidence level and 10% permissible error) through an active community search involving the local health staff and other community informants and looked for human rabies deaths in the last 3 years in urban and last 5 years in rural areas. The search was done for a 6 week ± 2 weeks period during March to May 2003. All the households having human rabies deaths were visited, and the medical college team collected the clinico-epidemiological information through a verbal autopsy.

**2. Veterinary:** The Commonwealth Veterinary Association, a collaborating agency through postal questionnaire obtained the data on rabies in animals during 1992-2001 from 18 Veterinary Colleges and 5 Premier Institutions in the country.

**3. Rabies Free Areas:** The islands of Andaman & Nicobar and Lakshadweep were personally visited by the APCRI survey team members in July and August 2003 (4 days each) and data was obtained from both medical and veterinary departments.

All the data was obtained by using structured, pretested, appropriate survey instruments. The survey duration was 6 months viz. March-August, 2003. The survey was monitored independently by WHO in May 2003 wherein 4 medical colleges were visited. The data was analyzed by Centre for Research in Health and Social Welfare Management (another collaborating agency) using SPSS Software.

The decadal (1992 - 2001) data from the isolation hospitals showed human rabies to be endemic and stable in the mainland India. Consequently, the community search for human rabies from 21 medical colleges revealed a total of 235 cases. The majority of human rabies deaths occurred in adults (64.7%) males (71.1%) and from poor/low income group (87.6%). The main animal responsible for human rabies was dog (96.2%), and sites of bite were lower limb (56.2%), upper limb (20.9%) and hands (17%). About 79% of rabies victims did not receive any anti-rabies vaccination and of those who took the vaccine (NTV/TCV) most of them did not complete the full course. The incubation period ranged from 2 weeks to 6 months duration in the vast majority (85%); it was lowest in bite on hands (8 days) and head & face (12 days). About 60% of victims had resorted to indigenous treatment and 55% sought hospital admission. Hydrophobia (95%) and aerophobia (66.4%) were the predominant clinical case features observed. About 50.6% died at home and autopsy was not done in any. A projected estimate of annual human rabies incidence based on the survey worked out to 17,137 (14,109 to 20,165 with 95% confidence) for the country or 1.7 per 100,000 population. An addition of 20% to include paralytic/atypical form of rabies provides an estimate of 20,565.

The survey revealed that majority (75%) of animal bite victims belonged to poor and low-income group. The main biting animal was dog (91.5%) of which 62.9% were strays and 37.1% pets. About 17% households had pet dogs and the pet dog: man ratio was 1: 36. The dog care practices were not satisfactory viz. veterinary consultation (35.5%), ARV usage (32.9%), Dog Collar (35.5%), Dog leash (38.9%) and Municipal license (4.3%). The overall situation was better in urban areas.

The annual incidence of animal bite was 1.7%; it was more in children (2.5%) and 68% of them were males. Only 39.5% of bite victims washed the wounds with soap and water and about 46.9% took anti-rabies vaccination. The usage of TCV

was higher (50.1%) as compared to NTV (46.9%) and compliance to the full course was about 40.5%. However, the use of RIGs was low (2.1%). The local applications to wound (36.8%) and indigenous remedies (45.3%) were quite popular. The main source (59.9%) of treatment was Government, and each animal bite involved an average of 4.4 treatment visits and costed Rs. 252/- (vaccine and other medicines) and resulted in a loss of 2.2 days of work (man days lost). The annual animal bite load was estimated to be about 17.4 million for the country.

The veterinary survey showed a high proportion of positivity (laboratory confirmation) among dogs (48.4%), cats (21.9%), cattle (61.4%), goats (48.7%) and horses (45%) and among the wild animals it was predominantly mongoose (87.5%) and jackals (92.9%). The veterinary data revealed a stable situation of rabies in dogs and cats during the last decade of 1992 - 2001.

The survey of rabies free areas of Andaman & Nicobar and Lakshadweep islands revealed both the areas to be rabies free. Additionally, the islands of Lakshadweep were also dog free. But the monitoring of occasional import of dogs into Andamans and cats into both islands was poor and there was no laboratory surveillance of rabies in both islands.

In conclusion, rabies is endemic and enzootic in the main land and the islands of Andaman & Nicobar and Lakshadweep are rabies free. Dog is the principal reservoir of the disease and the victims mostly belong to poor and low-income group. The use of rabies vaccination was low and of rabies immuneglobulins negligible. The overall situation was slightly better in urban areas.

It is recommended to improve the coverage and usage of modern rabies vaccination by replacing NTV with cost effective intradermal modern rabies vaccination. It is also recommended to introduce a more effective management of dog population. An effective monitoring of entry of dogs/cats into the islands of Andamans and Lakshadweep and laboratory surveillance for rabies is essential to maintain their rabies free status. A coordinated "**National Rabies Elimination Programme**" will ensure a **Rabies Free India by 2020**.

* * ❀ ❀ ❀ * *

# 1. INTRODUCTION

India is a vast country, with a population of 1027 million (2001, census) and a land area of 3.2 million Sq. kms. It shares land borders with six countries. After independence in 1947, in the last 56 years good progress has been made in the fields of science, technology, education and health. The literacy rates has increased from 18.33% (1951) to 65.38% (2001); the life expectancy improved from 46.5 years (1950) to 64 years (2001); the infant mortality rate dropped from 146 (1960) to 70 (1999). Similar progress has been made in agriculture and veterinary sciences, and now India has become the number 1 milk producer in the world; and No. 5 in poultry production and with surplus food grain availability. These have been possible by controlling many diseases in animals including foot and mouth disease and eliminating Rinderpest from the country. India has made rapid strides in space satellites, demonstrated nuclear capabilities and is known world over for its expertise and manpower in computer sciences, software, technical and health sciences. It is envisioned by the national leaders that by 2020 the country should be transformed to a developed nation. Despite all these both sylvatic and urban rabies have been present in India since ancient times. Rabies is present throughout the country, except on the islands of Lakshadweep, Andaman & Nicobar. Cases are seen throughout the year. There is no organized system of surveillance of rabies cases, and there is hence a lack of reliable data[1].

However from 1985, India continues to report every year 25,000 to 30,000 human rabies deaths which today accounts to 60% of the global report of 50,000 (WHO, 2002). The above figure of 25,000 was an estimate worked out, based on the projected statistics of isolation hospitals in the county in 1985, the Louis Pasteur Centenary Year (of discovery of anti-rabies vaccine, 1885-1985, NICD-1985). As rabies is not a notifiable disease and the 30,000 deaths reported by national authorities may not be a complete picture, as these represent only deaths reported from hospitals. It is estimated that the number of deaths due to rabies may be 10 times more than those reported[2].

**1.** Ichhpujani. R.L et al: Rabies in humans in India. 4th International Symposium on rabies control in Asia. Symposium proceedings Merieux Foundation & WHO. Ed. Betty Dodet & F. X. Meslin, 2001, Hanoi, Vietnam. John Libbey, Eurotext, London.

**2.** Park's Textbook of Preventive and Social Medicine, K. Park, 17th Edition, 2002; Banarasidas Bhanot, Jabalpur, M. P., P 201.

However, in the recent times many changes have taken place in the country viz., the modern vaccines imported initially in 1970s are now manufactured indigenously both in public and private sector and are now also exported. However, the information about dog population swelling to over 22 million, estimated animal bites per year was 2.28 million (NICD, 2000); the current statistics of animal bites, rabies in animal population are scanty, unreliable and controversial due to poor surveillance/ reporting system.

To cite an example the CBHI data on dog bites/ rabies is as follows (Table – i).

**Table – i**
**CBHI Data: Dog bites/Rabies**

| Year | Cases | Deaths |
|---|---|---|
| 1997 | 11529 | 386 |
| 1998 | 1250 | 365 |
| 1999 | 6610 | 483 |
| 2000 | 7248 | 412 |
| 2001 | – | 488 |

*Source: NICD, Delhi, 2003*

Hence, attempts have been made through different studies in many parts of India to obtain some valid and reliable data.

For example, a survey done by NICD, Delhi (2000) from 4 of its centers from urban communities revealed an incidence of animal bites of 2.1/1000 population/ year (Table – ii).

**Table – ii**
**Estimated Animal Bite Cases in India**

| City | Population Surveyed | Number of animal bites cases in last six months | 6 month incidence per 1000 population |
|---|---|---|---|
| Bangalore | 88469 | 85 | 0.96 |
| Calicut | 79169 | 20 | 0.25 |
| Coonoor | 43577 | 70 | 1.61 |
| Rajamundry | 71358 | 117 | 1.64 |
| **Total** | **282573** | **292** | **1.03** |

***Note**: Estimated animal bites in India/year is 2.28 million*

Also, many studies[3-6] conducted in different parts of India have the limitation of area specificity and cannot be generalized or extrapolated.

Alternatively, data was also obtained on the utilization of anti- rabies vaccines and sera in the country, which does indicate indirectly the problem of animal bites (Table – iii).

**Table – iii**
**Utilization of Vaccines and Sera**

| | |
|---|---|
| NTV | 35 million ML |
| TCV | 4.82 million doses (PCEC, PVRV & HDCV) |
| ARS | 150 litres |

***Source**: NICD, Delhi, 2003*

Similarly, for animal rabies the data is very scarce. The dog population is estimated to be 25 million most of which are ownerless and are not immunized against rabies[1].

Canine or other animal rabies is believed to be distributed ubiquitously in India, but on analysis of data on animal rabies (mostly clinically diagnosed) for the period 1991-2000 reveals that it was reported in only 128 of the 507 districts of the country, and the number of districts reporting rabies cases was further reduced to 30 during 1998-2000. There are large geographical areas of the country from which animal rabies has not been reported during the last 10 years[7].

In this background, to clarify the above situation of ignorance, conflict and confusion, APCRI, a registered scientific society (Annexure – I) with technical and financial assistance from World Health Organization undertook this multi-centric study with the following aim and objectives.

**3.** M. K. Sudarshan et al: An Epidemiological Study of Rabies in Bangalore City, JIMA, Vol. 93, No. 1; PP 14-17, 1995, Calcutta.

**4.** B. J. Mahendra et al: Clinico-epidemiological Study of Human Rabies Cases in Bangalore, APCRI Journal, Vol. 1, 2; PP, 2000, Bangalore.

**5.** M. K. Sudarshan et al: A Community Survey of Dog bites, Anti-rabies Treatment, Rabies and Dog Population Management in Bangalore City, Jour. of Comm. Dis., Vol. 33, No. 4; PP 245-251, 2001, Delhi.

**6.** H. K. Gohil et al: Human Rabies Situation in and around Delhi, APCRI Journal, Vol. 8, Nos. 1 & 2; PP 11-15, 2003, Bangalore.

**7.** A. B. Negi: Animal Rabies in India, 1996-2001: 4th International Symposium on Rabies Control in Asia. Symposium proceedings, Merieux Foundation & WHO. Ed. Betty Dodet & F. X. Meslin, 2001, Hanoi, Vietnam. John Libbey, Eurotext, London.

## 1.1 AIM

- To provide a comprehensive data on rabies and it's related aspects in the human and animal populations in India.

## OBJECTIVES

- To estimate the incidence of annual human rabies deaths and know the time trends of disease in man.
- To estimate the annual incidence of animal bites, know their management practices including the use of rabies immunobiologicals.
- To obtain a better and more realistic estimate of pet dog population and some aspects of their care.
- To recognize the common animal reservoirs of rabies and know the time trends of the disease in animals.
- To make recommendations for future activities for rabies elimination from India.

The results of this study should form the basis for all future rabies prevention and control activities in the country.

# 2. METHODOLOGY

The study consisted of mainly 3 approaches:

**a. Medical Survey:** Through the Departments of Community Medicine of Medical Colleges in the Country.

**b. Veterinary Survey:** Through the Departments of Veterinary Pathology of Veterinary Colleges and from some premier institutions like CRI, Kasauli, HP; NICD, Delhi; IVRI, UP; NIMHANS, Bangalore; Pasteur Institute, Coonoor and others.

**c. Survey of the Rabies Free Areas:** This involved collection of Data from the Islands of Andaman & Nicobar and Lakshadweep.

## 2.1 MEDICAL SURVEY

This was done through 21 Departments of Community Medicine of the medical colleges in the country. These were identified based on their geoscatter distribution of the country to ensure a proper geopopulation representative coverage (Annexure-II). The Heads of Institutions and Heads of Department of Community Medicine nominated a minimum MD qualified faculty member as the Principal Investigator, which was as per APCRI guidelines.

### 2.1.1 Orientation Workshop for Principal Investigators (PIs)

All the identified Principal Investigators (Annexure-II) except from IGMC, Shimla, HP, underwent an orientation training at APCRI HQs, Department of Community Medicine, Kempegowda Institute of Medical Sciences, Bangalore on February 24th, 2003. They were briefed about the survey methodology and the survey instruments by the Chief Investigator and the core survey team and in the presence of WHO observers and other invitees from other premier institutions in the country (Annexure-II). However, the PI of IGMC, Shimla, HP (and his team) was briefed separately by Survey Coordinator (Dr. B. J. Mahendra) later on 6th May, 2003 in his department as this medical college was identified subsequently to cover hilly area based on the recommendations made at the previous meeting in February 2003 in Bangalore. As almost all PIs had some survey experience under UIP, EPI, CSSM, RCH, etc., this survey did not pose difficulties to them and all expressed confidence of the proposed survey task.

These PIs on their return to their medical colleges identified 4 to 6 medical postgraduates/interns with an aptitude for survey work, briefed and oriented them to the proposed survey task.

### 2.1.2 Household Survey (Annexure-III, S-1 and S-2)

The objective of this survey was to obtain data on animal bites, anti-rabies treatment, pet dog population and their management. Each medical college randomly identified 4 communities viz. 1 urban and 3 rural population groups (wards, villages etc.) on the basis of 1:3 urban : rural ratio based on national demographic distribution. In urban area, a ward/zone/area was chosen randomly after obtaining the list from the urban municipal corporation. In rural area 1 RHTC training PHC (out of 3) was chosen randomly and the other 2 nearby PHCs (not used for RHTC training) were identified.

In each of these communities, the survey was started from the center place and after identifying the first household randomly (EPI household survey guidelines followed) the information was obtained by interviewing a reliable, responsible, adult respondent. After its completion, every tenth household (by systematic random sampling) was visited and in all 100 households were covered in each identified urban and rural communities (Annexure-III, S-1 & S-2 forms). The locked houses, commercial, non-residential dwellings and non-cooperative households were omitted. The survey was completed when 100 households in urban and 300 households in 3 rural communities was covered and thus each medical college covered a minimum of 400 households viz. about 2000 population based on an average family size of 5.

Thus, a total target population of 40,000 (from about 8000 households) was aimed to be covered from 21 medical colleges.

### 2.1.3 Hospital Statistics of Human Rabies Incidence (Annexure-III, S-3)

The mainland of India being a known rabies endemic area but with poor reporting mechanism, it was considered that information be obtained from Isolation Hospitals/Isolation Wards of Medical College Hospitals/District Hospitals attached to medical colleges. A decadal data of annual hospital admissions of human rabies cases during 1992-2001/2002 was obtained from 22 Isolation/District Hospitals (IGMC, Shimla, gave data of 2 hospitals attached to it) attached to these medical colleges (Annexure-III, S-3). The data so obtained served two purposes. Firstly, it

showed the overall trends of human rabies incidence and its endemicity over a decade. Secondly, the most recent human rabies deaths information was used to activate a community based search by the medical college team subsequently.

### 2.1.4 Extended Community search for Human Rabies Incidence (Annexure-III, S-4, S-5, S-6, S-7 & S-R)

The principal objective of this survey was to estimate the annual human rabies incidence in the country based on a community survey, which hitherto was not done. Whatever data that was available previously was known to be a projected estimate based on hospital data. Hence, this formed a crucial component of this survey.

The Principal Investigator and his/her team were to line list at least about 3 (from urban area) and 5 (from rural area) most recent human rabies cases/deaths; preferably of 2002-2003 with complete address (S-4 form). They formed the "index cases" for the human rabies search in the community. Subsequently, the medical college team visited the families of these cases at the household level through the jurisdiction viz. urban or rural health center/staff as relevant (S-5 form). At the household level the rabies death information was obtained by interviewing a reliable, responsible adult (>18 years) respondent viz. surviving spouse, parent, siblings and others. For each case, information from all relevant records, cards, papers were xeroxed and enclosed along with the case record form (S-6) of the survey. The signature of all medical college team investigators (medical) present at household was obtained to authenticate the data for its better validity and was signed/countersigned by the Principal Investigators. In brief, a "verbal autopsy" exercise was done for each identified human rabies death at the household level by the medical college team.

Following this a community search for other rabies cases/deaths in the community/health centre area was activated. Any rabies deaths in the last 3 years in urban areas (a lesser recall period considered due to more population mobility) and in the last 5 years in rural areas were actively searched. The 3-year/5-year recall was considered good and adequate to provide the necessary data. This search process was activated through MO of the Health Centre and by involving community informants viz. Health staff, Anganwadi workers, School teachers, Postman, Village accountants, Priest, Dhobi, Barber, Village leaders and others. Besides information was also obtained from other sources viz. Subregistrar offices (for deaths), burial grounds/crematoria, leading Nursing Homes and Private Hospitals, Veterinary Centres, IMA, other professional and social services groups.

A nominal allowance of Rs. 300 to Rs. 500/- towards meeting expenses and Rs. 100/- per case reported as surveillance expenses was paid to the MOs of HCs; and Rs. 100/- per case reported as "fieldwork allowance" was paid to the community informant/health staff.

A 6 weeks period (March-May 2003) was provided to carryout these intensive search operations for all cases of human rabies deaths in the community. All reported cases were visited at household level by the medical college team and after verification (mostly on clinico-epidemiological basis) viz. verbal autopsy exercise, recorded the information (S-6 form) and enclosed all available records with their signatures.

To meet the population sample size requirement of the survey for the country viz. 10 million, each medical college was provided a target population of 500,000 viz. 125,000 (3 year recall period allowed) for urban and 375,000 (5 year recall allowed) for rural areas. But in case of IGMC, Shimla, HP covering a hilly area a target of atleast 2 urban Health centres (3 year recall period) population and 4 to 6 PHCs (5 year recall period) was given.

After the completion of the Extended Community Search all the identified human rabies deaths/cases were line listed by each medical college with the details of the ward/zone/area (for urban) and PHCs (for rural) for population coverage, etc. (S-7 form) from where the cases/deaths were reported. This was done to obtain a more precise, valid and reliable incidence of human rabies based on community survey and a population data (and not on any hospital/institution based data).

Each medical college after the completion of the survey, verified the survey forms, prepared a summary report (Annexure-III, SR form) and couriered the schedules to APCRI HQs at KIMS, Bangalore.

### 2.1.5 Statistical considerations of the Survey

As this was a well-planned out survey it was considered important that it should be even sound on a statistical basis.

a. For estimating the annual animal bite incidence, details of anti-rabies treatment, pet dog population, etc. which was to be done through a house-to-house survey, based on the previous available estimated annual incidence of animal bites reported from various studies @ 1.5% annual

animal bite incidence, at 90% confidence level with a 10% limit of error it was considered to cover a sample of 40,000 population or viz. 8000 households (@ average family size of 5) from 21 medical colleges, allowing a margin for a few dropouts/unforeseen errors.

**SAMPLE SIZE CALCULATIONS**

- Annual Incidence of animal bites vary from 0.21% - 1.9% population (or 2-19 per 1000 people per year).
- 1.5% annual incidence was considered for this survey purpose.
- Survey Standards: 90% Confidence level; 10% limit of error.
- $(1.645)^2 \frac{Pq}{l^2}$
- P = 0.015 (1.5%)
- q = 0.985 (1-p)
- l = 0.0015 (10% of p)
- $(1.645)^2 \frac{(0.015) \times (0.985)}{(0.0015)^2}$
- 17,730 or 20,000 people (whole nos.)
- 40,000 population (twice the calculated population for design effect) is the sample population to be surveyed.

b. Similarly for estimating human rabies incidence the current reported incidence of 3 cases per 100,000 population (or 30,000 per 1 billion population of the country, WHO, 2002) was considered[8]. Based on this as per the planned survey precision of 90% confidence level and 10% of permissible error, about 9.1 million or 10 million (round figure) population coverage from 21 medical colleges with marginal coverage variations due to local factors was envisaged.

**8.** WHO, Weekly Epidemiological Record, 14, April 2002, Geneva.

## SAMPLE SIZE CALCULATIONS

- Human rabies incidence in India: 30,000, annually or 3/100,000 (WHO, 2002).
- Survey Standards: 90% confidence level; 10% limit of error.
- $(1.645)^2 \frac{Pq}{l^2}$
- P = 0.00003
- q = (1-p) 0.99997
- l = 0.000003
- $(1.645)^2 \frac{(0.00003) \text{ X } (0.99997)}{(0.000003)^2}$
- 90,19813 (or 10 million round figure)

Thus, the survey was done on sound statistical considerations, meeting sample size requirements, and the field survey largely based on randomized approach without any selection basis.

## 2.2 VETERINARY SURVEY (ANNEXURE-III, SV-1 & SV-11; ANNEXURE-IV)

To obtain data on another objective of the survey viz. recognizing common animal reservoirs of rabies based on laboratory confirmation, it was considered adequate to obtain data on a pretested and structured format of the animal rabies data for the last 10+ years viz. 1992-2001/2002 from the Departments of Pathology of Veterinary Colleges and some other premier institutions like CRI, Kasauli, NICD, Delhi, IVRI, Izzatnagar, UP, NIMHANS, Bangalore, Pasteur Institute, Coonoor, Tamilnadu and others. The details of methods of laboratory examination viz. Seller's stain, biological test, FAT was also obtained. The schedules were mailed as postal questionnaire by Commonwealth Veterinary Association (Dr. S. Abdul Rehman, Secretary) to the veterinary institutions and others and the data was obtained by mail after 1 to 2 reminders by mail/phone. Besides personal visits were also made to some institutions by the CVA/core team members of the survey.

## 2.3 SURVEY OF THE RABIES FREE AREAS (ANNEXURE-III, RFV, RFM, RFVM & RFD)

The islands of Andaman & Nicobar and Lakshadweep are reportedly rabies free[9]. Unlike the mainland it may be that the water barrier has been responsible for it. As a part of this survey when incidence of human and animal rabies was enquired from the Medical and Veterinary Directorates from these islands for the period of 1992-2002, it was reported as "nil" from both the islands. In addition the Director of Animal Husbandry, Lakshadweep Islands, reported that the islands are also free of dogs, both pet and stray.

Consequently, a different strategy was adopted to this special situation. A checklist of both medical and veterinary aspects to be examined in these islands was prepared after experts consultations (Annexure-III, RFV, RFM, RFVM). And these were used by investigators viz. Dr. M. K. Sudarshan, Chief Investigator (Port Blair, Andaman & Nicobar; July 28-31, 2003) and Dr. B. J. Mahendra, Coordinator (Kavaratti, Lakshadweep; August 4-7, 2003) visited these islands for validation of the information obtained of their Rabies Free status. Both the Medical, Veterinary, Government and Private sectors were covered for the purpose. The data was obtained mostly by interviews and perusal of records (Annexure-III, RFD).

## 2.4 TIMELINE OF THE SURVEY

The following timeline was followed for the survey.

| | |
|---|---|
| December 2002 | 3rd SC Meeting of WHO at Bangkok, approved the survey. |
| February 2003 | WHO-APCRI Orientation Meeting of Principal Investigators, WHO Representatives, Observers & others at KIMS, Bangalore. |
| March-May 2003 | Data Collection from Community & Institutions; Visit of WHO Monitor, GOI, Dr. K. Ravikumar to Medical Colleges, Interim Analysis. |
| June 2003 | 4th SC Meeting of WHO at NIMHANS, Bangalore – Progress Report. |
| July 2003 | • 5th APCRI Conference at Bhubaneshwar, Orissa – Draft Report Presentation. |
| | • Survey of Rabies Free Areas of Andaman & Nicobar and Lakshadweep. |
| August 2003 | Submission of Final Report (Draft) to WHO. |
| November 2003 | Oral Presentation of the final draft report to WHO and GOI at SEARO, New Delhi. |
| January 2004 | Circulation of revised draft report to WHO-GOI group. |
| February 2004 | Submission of Final Report to WHO. |

**9.** National Institute of Communicable Diseases, Zoonotic Diseases of Public Health importance, Rabies, 2000, Delhi-54.

## 2.5. MONITORING

To ensure quality, validity and acceptability of data an independent monitoring of the survey work of the medical colleges was done by Dr. K. Ravikumar, WHO, GOI, Nirman Bhavan, New Delhi. In the first week of May'2003, he visited 4 sites of Calcutta, Agra, Hyderabad and Goa and in these places visited the households and ID hospitals and health centres from where the data was collected. Overall, he found the survey work satisfactory.

At the APCRI HQs, all the medical and veterinary schedules and data were checked for legibility and completeness, correctness etc., by 2 designated persons (Drs. D. H. AshwathNarayana and T. V. Sanjay), who were familiar with the survey; and in addition was also seen by the Chief Investigator.

## 2.6. SURVEY COVERAGE

The mainland survey was done in 18 states, through 21 medical colleges which surveyed 84 communities (21 urban + 63 rural), 8500 households, covering a population of 52,731 for animal bite incidence and 10.80 million for human rabies incidence. The main survey lasted for about 6 weeks ± 2 weeks during March to May, 2003. The veterinary data was obtained from 14 states, 18 veterinary colleges and 5 other institutions (Annexure - IV).

**National Multi-Centric Rabies Survey 2003: An Overview**

| Details | Urban | Rural | Total |
|---|---|---|---|
| **Medical Survey** | | | |
| 1. States covered | --------- | --------- | 18 |
| 2. Medical Colleges | --------- | --------- | 21 |
| 3. Communities Surveyed | 21 | 63 | 84 |
| 4. Households Surveyed | 2194 | 6306 | 8500 |
| 5. Population Surveyed | | | |
| • For animal bites | 12844 | 39887 | 52731 |
| • For human rabies | 2734122 | 8107068 | 10841190 |
| **Veterinary Survey** | | | |
| 1. States covered | -------- | -------- | 14 |
| 2. Veterinary Colleges | -------- | -------- | 18 |
| 3. Other premier/major institutions | -------- | -------- | 5 |

***Note:*** *The Union Territories of Andaman & Nicobar and Lakshadweep Islands (Rabies Free Areas) also covered separately.*

The Union Territories (2) of Andaman & Nicobar and Lakshadweep Islands were specially surveyed separately in July-August, 2003, to assess their reported status of Rabies Free Areas.

## 2.7. DATA ANALYSIS AND REPORTING

The data was analyzed at a professionally competent agency viz. Centre for Research in Health and Social Welfare Management. The centre has had similar work experience in health projects of World Bank, UNICEF etc. The data was analyzed using Software SPSS and under the supervision and guidance of Professor N.S.N. Rao, M. Sc., Ph.D., a renowned Biostatistician of the country. The results are presented as simple proportions and projected estimates.

Before the final report, two interim short reports were presented in June (4th Steering Committee of WHO) and July (5th National Conference of APRCI) at Bangalore and Bhubaneshwar respectively. The draft final report submitted to WHO was discussed in November, 2003 by a WHO-GOI group at SEARO, New Delhi. The approved final report is sent to the Ministries of Health and Animal Husbandry, Government of India, and to Premier Institutions and participating Medical and Veterinary Colleges and others.

## 2.8. LIMITATIONS OF THE SURVEY

Though this is the first survey of rabies of this magnitude conducted in this country, due to paucity of funds and time constraints the study results must be viewed in the light of the following limitations.

### ❑ MEDICAL SURVEY

- All bite cases are "possibly exposed" to rabies (no laboratory confirmation of rabies in the biting animal).
- Pet dog numbers are as informed by household informants.
- Human Rabies deaths are mostly "probable cases" (96.6%); 8 (3.4%) "suspected cases" and none "confirmed" by laboratory evidence. However, atypical and paralytic forms of the disease might have been missed.
- Human Rabies cases were detected by "Community/Informants search" and not by door-to-door search of medical college team.
- Memory recall lapses/attrition and population/case migration has been an influencer in the community surveys.

❑ **VETERINARY SURVEY**

- It is only an institutional survey and not a community survey.
- The confirmation of rabies in most animals was based on demonstration of "Negri bodies".

Despite all these above limitations, which are made explicit, the results of this survey are adequate to form the basis for initiating measures for Prevention and Control of Rabies in India in future.

## 2.9. BUDGETARY CONSIDERATIONS

A sum of US$ 22,000 (Rs. 10.5 Lakhs) was provided by WHO, SEARO, New Delhi in 5 installments of Rs. 2 lakhs, Rs. 2 lakhs, Rs. 4 lakhs, Rs. 1.5 lakhs and Rs.1 lakh. All payments were made into the Bank Account of "APCRI" at Bangalore.

## 2.10. APCRI SURVEY TEAM

The Chief Investigator (Dr. M.K. Sudarshan) was overall responsible for all technical and administrative aspects of the survey, including all presentations and reports. The Co-investigator (Dr. S. Abdul Rahman), was responsible for the veterinary component of the study. The Coordinator (Dr. B.J. Mahendra) was responsible for organizing the orientation meeting of Principal Investigators and subsequently to liaise with them and other organizations and follow up. The treasurer (Dr. D.H. AshwathNarayana) managed the finances and auditing of the accounts.

The advisory group of Drs. R.L. Ichhpujani, L.N. Rao Bhau and S. N. Madhusudhana provided the necessary directions and guidance periodically. The Chief Consultant, Biostatistics, Dr. N.S.N. Rao was overall responsible for the data management including data entry and analysis. He was assisted by another Biostatistician (Dr. Gangaboriah). The secretarial assistance was provided by Smt. Girija Narayan and DTP Report and slides (on Floppy/CD) were prepared by Mr. A.S. Madhukeshwara. The typeset of the final (print version) copy was prepared by Mr. Anubhavi.

# 3. RESULTS

The results of the survey are presented under the following broad heads:

1. Human Rabies Incidence
2. Animal Bite Incidence
3. Rabies in Animals
4. Rabies Free Areas
5. Burden of Rabies in India

## 3.1 HUMAN RABIES INCIDENCE

The assessment of magnitude of the problem of human rabies in India constituted a very important component of this survey.

### 3.1.1 Hospital incidence (Table - 1)

The isolation hospitals and isolation wards of Medical Colleges/District Hospitals mostly admit and manage human rabies cases. The diagnosis in these hospitals is mostly on clinico-epidemiological basis and it is based on a decision/ judgement of a medical team. Besides these hospitals constitute the sentinel surveillance centres for communicable diseases in the country.

An analysis of case records of these hospitals showed that the disease is endemic and situation quite stable in the last decade (Table - 1).

However, after knowing the bad prognosis of the disease, majority would leave the hospital and as a result there were some marginal errors in recording those who left the hospital against medical advice.

### 3.1.2 Community Incidence

As hospital incidence of human rabies is a well known "Iceberg Phenomenon" and certainly not reflecting the true situation in the community, this survey for the first time activated a "community search" for human rabies deaths in the community. A total of 235 deaths were investigated at the household level by a medical team from the medical colleges.

**Table – 1**
**A decadal hospital incidence of human rabies+ during 1992-2002**

| Year | Cases | Deaths | LAMA++ |
|---|---|---|---|
| 1992 | 876 | 413 | 456 |
| 1993 | 908 | 373 | 525 |
| 1994 | 924 | 374 | 527 |
| 1995 | 933 | 380 | 526 |
| 1996 | 730 | 340 | 390 |
| 1997 | 886 | 339 | 545 |
| 1998 | 791 | 318 | 472 |
| 1999 | 782 | 313 | 466 |
| 2000 | 802 | 301 | 493 |
| 2001 | 707 | 297 | 405 |
| 2002 | 728 | 304 | 418 |

***Source:*** *From 22 Infectious Diseases Hospitals/Medical College Hospitals of 18 states.*

*+ – All probable cases based on clinico-epidemiological diagnosis.*

***Note:*** *++ – The totals are not correct due to possible errors in recording.*
*LAMA – Left Against Medical Advice*

### 3.1.2.1 Profile of Human Rabies

Majority of human rabies victims were adults (64.7%), men (71.1%) and were from poor income levels (87.6%) and this would have definitely affected the surviving family members very adversely leading to untold misery and hardships (Table - 2). However, the disease is also reportedly known to occur in relation to occupation and exposure of people.

**Table – 2**
**Results of survey of human rabies incidence**

| Details | Urban | Rural | Total |
|---|---|---|---|
| 1. Human Rabies Deaths | 56 | 179 | 235 |
| 2. Age Distribution | | | |
| • Children (≤ 14 years) | 25.5 | 38.3 | 35.3 |
| • Adults (> 14 years) | 74.5 | 61.7 | 64.7 |
| 3. Sex Distribution | | | |
| • Male | 72.7 | 70.6 | 71.1 |
| • Female | 27.3 | 29.4 | 28.9 |
| 4. Economic Level | | | |
| • Poor and Low Income | 81.9 | 89.3 | 87.6 |
| • Middle Income | 14.5 | 7.8 | 9.4 |
| • Upper Income | 1.8 | 1.7 | 1.7 |
| • Not Assessed/Reported | 1.8 | 1.2 | 1.3 |

***Note:*** *Figures are in percentages (except item 1)*

### 3.1.2.2 Biting Animal, Bite and Treatment

The biting animal mainly responsible for human rabies death was dog (96.2%) [Table- 3] of which majority were strays (75.2%) followed by pets (11.1%), wild (3.5%) and others/unknown (10.2%). Overall, the cats accounted for 1.7% of deaths. Among the wild animals clearly specified were 2 (0.85%) deaths due to jackals, from Berhampur, Orissa.

**Table – 3**
**Human rabies incidence: Biting animal, bite and treatment**

| Details | Urban | Rural | Total |
|---|---|---|---|
| 1. Biting Animal | | | |
| • Dog | 98.2 | 95.6 | 96.2 |
| • Cat | 1.8 | 1.7 | 1.7 |
| • Others | ---- | 2.7 | 2.1 |
| 2. Site of Bite[+] | | | |
| • Head and Face | ---- | ---- | 11.5 |
| • Trunk | ---- | ---- | 1.7 |
| • Upper Limb | ---- | ---- | 20.9 |
| • Hands | ---- | ---- | 17.0 |
| • Lower limb | ---- | ---- | 56.2 |
| • Others | ---- | ---- | 2.1 |
| *+ - Includes Multiple Bites/Responses* | | | |
| 3. Vaccine Treatment (Yes) | 30.9 | 17.6 | 20.9 |
| • NTV | 20.0 | 8.3 | 11.1 |
| • TCV | 14.5 | 8.3 | 9.8 |
| • RIG | 3.6 | 0.6 | 1.3 |
| 4. Incubation Period | | | |
| • 0 – 14 Days | | | 5.1 |
| • 15 – 30 Days | | | 17.9 |
| • 31 – 90 Days | | | 53.2 |
| • 91 – 180 Days | | | 14.0 |
| • 181 – 365 Days | | | 5.1 |
| • 366 + Days | | | 4.7 |

***Note:*** *Figures are in percentages*

The status of biting animal was unknown (46.4%) or killed (28.5%) or dead (23.0%) and surprisingly in 2.1% cases it was reported as alive by surviving household members [Table - 4]. This might be that either the people were observing the wrong animal or had forgotten trivial bite by a rabid animal in the past.

**Table – 4**
**Status of biting animal**

| Status | No. | Percentage |
|---|---|---|
| Alive | 5+ | 2.1 |
| Dead | 54 | 23.0 |
| Killed | 67 | 28.5 |
| Unknown | 109 | 46.4 |

*+ - Information provided by household member has certain limitations of its validity, reliability and hence acceptability*

The site of bite was on lower limbs (56.2%) followed by upper limbs (20.9%), hands (17.0%) and then the head and face (11.5%). Majority (79.1%) had not received anti-rabies vaccine and even those who had received it mostly had incomplete/irregular/delayed treatment. The use of RIGs was very low. In 85% of the cases the incubation period was less than 180 days (6 months) and only about 5.2% reported it to be less than a fortnight. The mean incubation period was lowest (42 days) in bites on head (including face) and was highest (107 and 108 days) in those on upper limbs (excluding hands) and lower limbs [Table - 5].

**Table – 5**
**Human rabies deaths: Site of bite and incubation period**

| Site of Bite | No. | Incubation Period (Days) | | |
|---|---|---|---|---|
| | | Mean | Minimum | Maximum |
| Head Only | 20 | 42 | 12 | 180 |
| Trunk only | 2 | 45 | 45 | 45 |
| Upper Limb only | 30 | 108 | 20 | 1095 |
| Hands only | 30 | 83 | 8 | 360 |
| Lower limbs only | 116 | 107 | 15 | 545 |
| Multiple Bites | 23 | 48 | 13 | 96 |

**Table – 6**
**Human rabies deaths: Number of doses of vaccine taken**

| Vaccine type | Number of doses taken | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | NS |
| NTV (n=26) | 15.5 | 3.8 | 11.6 | 7.7 | 11.5 | 7.7 | 3.8 | 3.8 | 3.8 | 11.5 | -- | -- | -- | 3.8 | 15.4 |
| TCV (n=23) | 26.1 | 34.8 | 8.7 | 4.3 | 8.7 | 8.7 | 4.3 | -- | -- | -- | -- | -- | -- | -- | 4.3 |

Majority viz. 186 (79%) had not received any rabies vaccination. Out of 20.9% of victims who had taken anti-rabies vaccine, 11.1% had received NTV and 9.8% TCV. However, number of doses of vaccine received as ascertained from some households revealed (Table - 6) that about 15% had completed the course of NTV (10/14 injections as relevant) and another 21% had completed the course of TCV (5 to 6+ injections).

Only 1.3% informed of having received RIGs. Those who started on anti-rabies vaccination following bite of a rabid animal 7.6% taken ARV within a day of bite and another 6.0% in the next 2 to 3 days (Table - 7).

**Table – 7**
**Time lag between bite and starting ARV**

| Time Lag | No. | Percentage |
|---|---|---|
| < 1 day | 18 | 7.6 |
| 2 – 3 days | 14 | 6.0 |
| 4 – 5 days | 3 | 1.4 |
| 6 – 7 days | 4 | 1.7 |
| 8+ days | 10 | 4.2 |
| No ARV | 186 | 79.1 |
| **Total** | **235** | **100.0** |

About 60% of victims had resorted to indigenous treatment (Table-8).

The most commonly resorted practices were magico-religious (28.9%) followed by herbal therapy (10.6%).

**Table – 8**
**Details of indigenous treatment done**

| Indigenous Treatment | No. | Percentage |
|---|---|---|
| Magico-Religious (faith healing, witchcraft, etc.) | 68 | 28.9 |
| Herbal Therapy | 25 | 10.6 |
| Consulting Quacks | 14 | 5.9 |
| Application of Red chilli Powder | 12 | 5.1 |
| Application of Turmeric Powder | 5 | 2.2 |
| Other Local Applicants/Dressings | 16 | 6.8 |
| None | 95 | 40.5 |
| **Total** | **235** | **100.0** |

### 3.1.2.3 Clinical Manifestations, Medical Care and the Details of death (Tables 9 to 11)

The predominant feature was hydrophobia (95.7%) followed by aerophobia (66.4%) and photophobia (33.2%) and paresis/paralysis was seen only in 21.3% (Table - 9 & Figure 1).

**Table – 9**
**Clinical spectrum of human rabies**

| Clinical Feature | No. | Percentage |
|---|---|---|
| Hydrophobia | 225 | 95.7 |
| Aerophobia | 156 | 66.4 |
| Photophobia | 78 | 33.2 |
| Paresis/Paralysis | 50 | 21.3 |

Majority of victims had sought medical consultation (27.6%) and hospital admission (55.8%) and in only about 16.6% none were done (Table - 10).

**Table – 10**
**Medical care seeking behaviour**

| Medical Care | No. | % |
|---|---|---|
| Only medical consultation (Outpatient) | 65 | 27.6 |
| Medical consultation + Hospital admission (after referral) | 125 | 53.2 |
| Direct hospital admission* | 6 | 2.6 |
| None/Not stated | 39 | 16.6 |
| **Total** | **235** | **100.0** |

** These include those who were directly admitted in a hospital (without any outpatient consultation)*

Majority (50.6%) died at house without taking any treatment and the rest had died in hospital (35.3%) and in transit (11.9%) [Table - 11]. The postmortem/ medical autopsy was not done and hence no laboratory confirmation was possible. Consequently, as per WHO criteria only 8 (3.4%) were "suspected cases" (compatible with clinical description only) and the rest (96.6%) were "probable cases" (suspected cases + history of contact with suspected rabid animals) and none belong to "confirmed" (i.e., laboratory confirmed) case category. However, the death report of the case was available in only 17% of the surviving families and 31% had death certificate of the deceased person (Table - 11).

**Table – 11**
**Human rabies: Details of death**

| Details of Death | No. | Percentage |
|---|---|---|
| a. Place of Death | | |
| • Hospital | 83 | 35.3 |
| • House | 119 | 50.6 |
| • Transit | 28 | 11.9 |
| • Not stated | 5 | 2.2 |
| b. Postmortem Done | NIL | ----- |
| c. Death Report Available | 40 | 17.0 |
| d. Death Certificate | 73 | 31.1 |

### 3.1.2.4 Estimating the Burden of Human Rabies in India

According to WHO (2002) an estimated 30,000 human rabies deaths occur every year in India. This was done on a projected estimate based on hospital rabies data. In this study, an active community search of about 6 weeks (± 2 weeks) during March-May 2003 was done by 21 Medical Colleges in 18 states covering a population of 10.8 million (or 10,841190 precisely) with a recall of 3 years for urban/5 years for rural areas. A total of 235 human rabies deaths were identified (Table - 12) & (Annexure - V).

**Table – 12**
**Results of survey for human rabies cases**

| States | Human Rabies Cases Detected | | |
|---|---|---|---|
| | Urban | Rural | Total |
| 1. Jammu & Kashmir | 1 | 4 | 5 |
| 2. Punjab | 3 | 10 | 13 |
| 3. Himachal Pradesh | 0 | 3 | 3 |
| 4. Delhi | 6 | 17 | 23 |
| 5. Uttar Pradesh | 4 | 29 | 33 |
| • Agra | (1) | (20) | (21) |
| • Varanasi | (3) | (9) | (12) |
| 6. Bihar | 4 | 12 | 16 |
| 7. West Bengal | 6 | 10 | 16 |
| 8. Assam | 2 | 9 | 11 |
| 9. Orissa | 5 | 20 | 25 |
| • Behrampur | (2) | (12) | (14) |
| • Cuttack | (3) | (8) | (11) |
| 10. Rajasthan | 3 | 7 | 10 |
| 11. Gujarat | 2 | 7 | 9 |
| 12. Goa | 2 | 10 | 12 |
| 13. Maharashtra | 5 | 11 | 16 |
| 14. Madhya Pradesh | 3 | 5 | 8 |
| 15. Andhra Pradesh | 3 | 5 | 8 |
| 16. Karnataka | 3 | 4 | 7 |
| 17. Tamilnadu | 2 | 6 | 8 |
| 18. Kerala | 2 | 10 | 12 |
| • Kannur | (1) | (3) | (4) |
| • Thrissur | (1) | (7) | (8) |
| **Total** | **56** | **179** | **235** |

A year-wise analysis (Table - 13) revealed that over half the detected cases (53.5% or 126 cases) had occurred in 2002-03 years or precisely 16 months of the survey recall period. This lead to the assumption that there was possibly a factor of memory recall attrition or migration/mobility of affected family which was influencing the number of cases detected by this kind of search. Hence, it was considered important to restrict the number of cases to only those, which were detected in the recent period of 2002-03 (16 months).

**Table – 13**
**Results of community search: Annual human rabies detected**

| Year | Months | Urban[+] | Rural[++] | Total (%) | |
|---|---|---|---|---|---|
| 1998 | 12 | ---- | 11 | 11 (4.7) | (100.0)* |
| 1999 | 12 | ---- | 16 | 16 (6.8) | (95.3) |
| 2000 | 12 | 7 | 36 | 43 (18.3) | (88.5) |
| 2001 | 12 | 11 | 28 | 39 (16.5) | (70.2) |
| 2002 | 12 | 27 | 58 | 85 (36.2) | (53.5) |
| 2003 | 4[+++] | 11 | 30 | 41 (17.4) | (17.4) |
| **Total** | **64** | **56** | **179** | **235 (100.0)** | |

***Note:*** *+ - 3-year Recall duration*
*++ - 5-year Recall duration*
*+++ - January to April (4 months or 120 days only)*
** - Reverse cumulative total (%)*

Consequently, the cases accounted were 123 (3 cases from 126 actual incidence were omitted as outlayers as their area (Delhi) had an abnormally large population base and could lead to errors in precise estimation) and the base/ denominator population or surveyed population was the census 2001 population (Annexure - V). Using the natural growth rate factor as per census 2001, the mid year population was estimated for 2002 and the final population surveyed was estimated as on 30th April 2003, the period of reporting of the most recent human rabies deaths in the survey. This was 10.8 million (Table - 14), which met the sample size precision requirement of 10 million.

Subsequently, the actual annual human rabies incidence was calculated on the basis of man-days of exposure. The resultant final estimated figure was 17,137 (14,109 to 20,165 at 95% confidence) or 1.7 per 100,000 population. An addition of 20% to include paralytic/atypical forms of rabies provides an estimate of 20,565. The possible reasons for its (43%) reduction from 25,000 (1985)/30,000 (1990 onwards) to this figure of 17,137 (or 20,565) over these 13 to 18 years might be due to overall improvement in the socio-economic development resulting in better access and utilization of medical care facilities by people and indigenous production and improved coverage of modern rabies vaccines. Besides the previous estimate of 25,000/30,000 itself might have been on higher side as it was based more on projected hospital statistics which was less accurate and had data limitations.

**Table – 14**
**Estimation of human rabies deaths in one year**

| | Year | No. of Rabies Deaths Reported | |
|---|---|---|---|
| Urban | 2002 | 25 | (Upto 30th April 2003) |
| | 2003 | 11 | |
| Rural | 2002 | 58 | (Upto 30th April 2003) |
| | 2003 | 29 | |
| **Total** | | **123** | |

**ESTIMATION OF POPULATION AT RISK**

Base or Surveyed Population (2001)

Urban : 1298897

Rural : 3935290

**Total : 5234187**

| | | Estimated Population as per natural growth rates as on 1st March of the year | Mid Year Populations for 2002 (1st July 2002) & Mid Period Population for 2003 (1-3-2003). |
|---|---|---|---|
| Urban | 2002 | 1339293 | 1353177 |
| | 2003 | 1380945 | 1380945 |
| Rural | 2002 | 4005732 | 4029633 |
| | 2003 | 4077435 | 4077435 |
| **Total** | | **10803405** | **10841190** |

| | Year | Man Days of Exposure | |
|---|---|---|---|
| Urban | 2002 | 1353177 x 365 Days | 493909605 Man Days |
| | 2003 | 1380945 x 120 Days | 165713400 Man Days |
| Rural | 2002 | 4029633 x 365 Days | 1470816045 Man Days |
| | 2003 | 4077435 x 120 Days | 489292200 Man Days |
| **Total Man days of Exposure** | | | **2619731250 Man Days** |

| | |
|---|---|
| Total Rabies Deaths Reported | **123** |
| No. of Rabies Deaths per one million Man Days of Exposure | 123/2619731250 x 1 million<br>= 0.04695138 |
| No. of Rabies Deaths/one million Man Years of Exposure | 0.04695138 x 365<br>= 17.13725406 |
| No. of Rabies Deaths/1000 million (1 billion) population in one year (or 1000 million man years) | 17.13725406 x 1000<br>= **17137**<br>(1.7 per 100,000 population) |

| | |
|---|---|
| S. E. of probability of a rabies death in one year | 0.000001545 |
| 95% confidence interval for rabies death estimate in one year per 1000 million (or 1 billion) population | (17137-3028) to (17137 + 3028)<br>**= 14109 to 20165** |

**Note:** a. Base or Surveyed population referred to is 2001 Census Population.

b. The natural growth rate of 3.11% of urban and 1.79% for rural population is applied as per Census 2001 of GOI.

c. For 2002, mid year population (as on 1st July) is estimated, while for 2003, mid period population (as on 1st March) is estimated.

d. 16 months recall period of the survey is used to get a better, precise and valid estimate of the human rabies incidence.

e. 2 cases of 2002 urban and one case of 2003 rural from Delhi for which population was ambiguous were excluded for estimation.

f. SE = $\sqrt{pq/n}$

p = 123/7177346 = 0.000017137

q = (1-p) = 0.999982863

n = 2619731250 Man days ÷ 365 days = 7177346 Man years exposure

g. 95% confidence interval: p ± 1.96 SE (p).

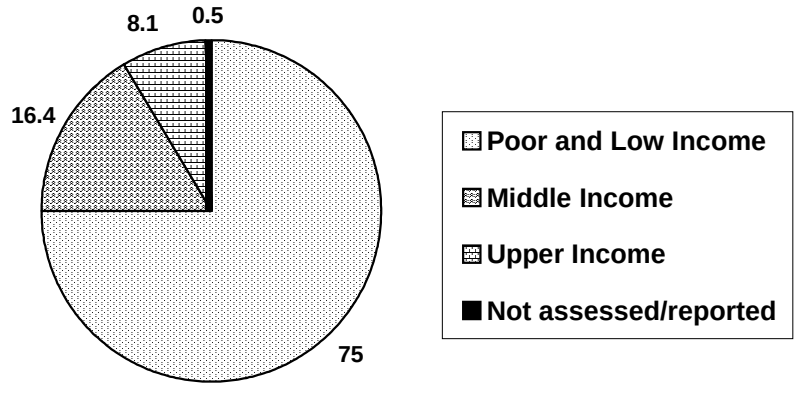
## 3.2. ANIMAL BITE INCIDENCE (TABLES 15 - 18; FIGURE 1)

A total of 8500 households were surveyed from 84 communities viz. 21 urban and 63 rural communities from 21 medical colleges and the resultant population covered was 52731 (132%) as against the target population of 40,000 (Table - 15).

### 3.2.1. Bite victims, Pet Dogs and their Care/Management

Majority of the bite victims belonged to Poor and Low Income (75%) group and it was more so (80.3%) in rural area (Table - 15 & Figure: 1).

**Figure 1: Economic Status of Animal bite victims**



A total of 1458 pet dogs were reported by respondents from 8500 households with a population of 52,731. About 16.9% of households had pet dog(s) and the pet dog: man ratio was 1: 36.

The dog care and management practices were not satisfactory as veterinary consultation was low (35.5% overall, 23.8% in rural areas) and the ARV coverage was poor viz. 32.9% overall and 22.0% rural. Besides, the stray dog presence (83%) and menace (22.8%) was high. The municipal licensing was also very poor (4.3% overall and 10.7% in urban areas) [Table - 15].

**Table – 15**
**Results of household survey: Bite victims, pet dogs and their care/management**

| Details | Urban | Rural | Total |
|---|---|---|---|
| 1. Households surveyed | 2194 | 6306 | 8500 |
| 2. Population covered | 12844 | 39887 | 52731 |
| • Children (< 14 years) | 3657 | 12947 | 16604 |
| • Adults (> 14 years) | 9187 | 26940 | 36127 |
| 3. Economic Status | | | |
| • Poor and Low Income | 59.7 | 80.3 | 75.0 |
| • Middle Income | 21.3 | 14.7 | 16.4 |
| • Upper Income | 18.8 | 4.4 | 8.1 |
| • Not assessed/reported | 0.2 | 0.6 | 0.5 |
| 4. Households with pet dog | 16.2 | 17.2 | 16.9 |
| 5. Pet dog : Man ratio | 1 : 35 | 1 : 37 | 1 : 36 |
| 6. Dog Care Management | | | |
| • Veterinary Consultation (Yes) | 71.3 | 23.8 | 35.5 |
| • ARV given (Yes) | 66.1 | 22.0 | 32.9 |
| • Dog collar (Yes) | 58.1 | 28.1 | 35.5 |
| • Dog leash (Yes) | 63.0 | 31.0 | 38.9 |
| • Dog notice (Yes) | 6.2 | 1.9 | 3.0 |
| • Municipal License (Yes) | 10.7 | ------- | 4.3 |
| 7. Stray Dog information | | | |
| • Presence (Yes) | 78.4 | 84.5 | 83.0 |
| • Menace (Yes) | 22.8 | 22.8 | 22.8 |

***Note:*** *Figures are in percentages for items 3, 4, 6 and 7*

### 3.2.2 Bite Incidence and Biting Animal

The annual incidence of animal bite is 1.7% (916 persons bitten in the last one year, out of 52731 surveyed) and the bites were more in children (2.5%) and males (68%) [Table - 16].

**Table – 16**
**Details of animal bite incidence and biting animal**

| Details | Urban | Rural | Total |
|---|---|---|---|
| 1. Population Surveyed | 12844 | 39887 | 52731 |
| 2. Annual Incidence rate of animal bite | | | |
| • Children (< 14 yrs) (per 100 children) | 2.1 | 2.6 | 2.5 |
| • Adults (> 14 yrs) (per 100 adults) | 1.1 | 1.4 | 1.3 |
| • Total (per 100 persons) | 1.4 | 1.8 | 1.7 |
| 3. Sex-wise Distribution | | | |
| • Male | 65.9 | 68.5 | 68.0 |
| • Female | 33.0 | 31.3 | 31.7 |
| • Not specified | 1.1 | 0.2 | 0.3 |
| 4. Biting Animal | | | |
| • Dog | 91.9 | 91.4 | 91.5 |
| ・Pet | 40.0 | 36.4 | 37.1 |
| ・Stray | 60.0 | 63.6 | 62.9 |
| • Cat | 4.9 | 4.7 | 4.7 |
| • Monkey | 2.7 | 2.1 | 2.2 |
| • Pig | ---- | 0.5 | 0.4 |
| • Rat | ---- | 0.7 | 0.5 |
| • Cow | ---- | 0.1 | 0.1 |
| • Wild | | | |
| ・Jackal | ----- | 0.3 | 0.2 |
| ・Bear | ----- | 0.1 | 0.1 |
| • Others/Not Stated | 0.5 | 0.1 | 0.3 |
| 5. Fate of Biting Animal | | | |
| • Dog | | | |
| ・Alive | 67.1 | 59.3 | 60.8 |
| ・Died | 5.3 | 7.9 | 7.4 |
| ・Killed | 5.9 | 13.0 | 11.6 |
| ・Unknown | 21.7 | 19.8 | 20.2 |
| • Cat | | | |
| ・Alive | 66.7 | 67.6 | 67.4 |
| ・Died | ----- | 5.9 | 4.7 |
| ・Killed | ----- | 8.8 | 7.0 |
| ・Unknown | 33.3 | 17.7 | 20.9 |

***Note:*** *Figures are in percentages (except for item 1)*

According to WHO Classification all bite cases belonged to "possibly exposed" category and none belonged to "exposed" category due to lack of confirmation of rabies in biting animal.

The most common biting animal was dog (91.5%) and majority of them were strays (62.9%). However, it was good to note that majority of biting dogs (60.8%) and cats (67.4%) were reportedly alive (Table - 16).

### 3.2.3 Anti-Rabies Treatment (Tables 17 to 19)

Only 39.5% of bite victims washed the wounds with soap and water and this practice was better in urban areas (48.6%). Only 47.9% took anti-rabies vaccination. It was also good to see a predominance of TCV usage (50.1%) over NTV usage (46.9%). A slightly higher usage of TCV (52.7%) in rural area may be due to non-availability of NTV. But the TCV coverage was low viz. 30% for 3 doses and 42.7% for 5 doses. Even the RIGs usage was low (2.1%) [Table - 17].

**Table – 17**
**Household survey for animal bite incidence:**
**Details of anti-rabies treatment done**

| Details | Urban | Rural | Total |
|---|---|---|---|
| Anti-Rabies Treatment done | | | |
| • Wound treatment (soap and water done) | 48.6 | 37.2 | 39.5 |
| • Vaccine taken | 57.8 | 45.4 | 47.9 |
| ・NTV | 56.1 | 44.0 | 46.9 |
| ・TCV | 42.1 | 52.7 | 50.1 |
| ・3 doses | 32.6 | 29.7 | 30.5 |
| ・5 doses | 41.9 | 42.9 | 42.7 |
| • RIGs received | 1.1 | 2.3 | 2.1 |
| • Local application to wound (Yes) | 36.2 | 36.8 | 36.8 |
| • Indigenous treatment done (Yes) | 35.1 | 47.9 | 45.3 |
| • Source of treatment | | | |
| ・Government | 69.2 | 56.9 | 59.9 |
| ・Private | 29.9 | 38.9 | 36.7 |
| ・Not stated | 0.9 | 4.2 | 1.1 |
| • Total Visits | | | |
| ・Mean | 4.9 | 4.2 | 4.4 |
| ・SD | 3.4 | 3.2 | 3.2 |
| ・Range | 1 – 25 | 1 – 16 | 1 – 25 |

| Details | Urban | Rural | Total |
|---|---|---|---|
| • Cost of Medicines (in US$) | | | |
| ⋅ Mean | Rs. 250/- (US$5) | Rs. 253/- (US$5) | Rs. 252/- (US$5) |
| ⋅ SD | Rs. 175/- | Rs. 167/- | Rs.166/- |
| ⋅ Range | Rs.5 – 1000/-+ | Rs.5 – 1000/-+ | Rs.5 – 1000/-+ |
| • Total days of leave (Loss of work) | | | |
| ⋅ Mean | 2.4 | 2.1 | 2.2 |
| ⋅ SD | 7.3 | 7.6 | 7.5 |
| ⋅ Range | 0 – 120 | 0 – 60 | 0 – 120 |
| • Source of Vaccine | | | |
| ⋅ Government | | | |
| ⋅ For NTV | 95.0 | 84.2 | 87.4 |
| ⋅ For TCV | 64.4 | 64.6 | 64.5 |
| ⋅ Private | | | |
| ⋅ For NTV | 5.0 | 10.3 | 8.7 |
| ⋅ For TCV | 64.4 | 64.6 | 64.5 |

***Note:*** *Figures with decimals are in percentages*

The source of anti-rabies treatment was predominantly Government (59.9%); and involved an average visit of 4 to 5 days, costing about Rs. 252/- for the medicines (including vaccines, etc.) and resulting in a loss of about 2.2 days (Man days loss) [Table - 17].

The use of local applications to wounds was common (36.8%). The application of herbs (5.7%) and red chilli powder (5.2%) were the most commonly used remedies (Table - 18).

The indigenous treatment was also popular (45.3%) and more so in the rural areas (47.9%) and magico-religious (faith healing, witchcraft, etc.) practices were the most common (15.7%) [Table - 18].

Among those who started on vaccine, the compliance for completing the full course was same (40.5%) both for TCV (5+ injections) and NTV (10/14 injections as relevant) [Table - 19].

**Table – 18**
**Types of indigenous treatments for animal bite wounds**

| Type of Treatment | No. | % |
|---|---|---|
| • Magico-religious (faith healing, witchcraft, etc.) | 144 | 15.7 |
| • Application of Herbs | 52 | 5.7 |
| • Red chilli Powder | 46 | 5.2 |
| • Ayurvedic Treatment | 28 | 3.1 |
| • Consulting Quacks | 13 | 1.4 |
| • Application of Rukri gur (a product of molasses) | 14 | 1.5 |
| • Application of Turmeric Powder | 11 | 1.2 |
| • Application of Kerosene | 9 | 0.9 |
| • Clean dressing | 8 | 0.8 |
| • Heat Cauterization | 7 | 0.7 |
| • Other local applicants viz. Jack fruit juice (2), Ointment (2), root decoction (1), application of salt (1) | 6 | 0.6 |
| • Nil | 578 | 63.2 |
| **Total** | **916** | **100.0** |

**Table – 19**
**Animal bite victims: Number of doses of vaccine taken**

| Vaccine type | Number of doses taken | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | $14^{+}$ | NS |
| NTV (n=206) | 7.8 | 6.3 | 13.1 | 4.9 | 18.0 | 6.8 | 22.3 | 1.5 | 0.5 | 8.3 | 1.0 | 3.4 | Nil | 4.9 | 1.0 |
| TCV (n=220) | 10.0 | 11.8 | 30.5 | 4.1 | 28.6 | 11.9 | -- | -- | -- | -- | -- | -- | -- | -- | 3.1 |

*NS – Not Stated*

## 3.3. RABIES IN ANIMALS

One of the objectives of this survey was to recognize the common animal reservoirs of rabies and know the time trends of the disease in animals. For this it was considered adequate to obtain data from institutions viz., Veterinary Colleges, IVRI, CRI, NICD, NIMHANS, Pasteur Institute, Coonoor and others based on their records of laboratory diagnosis of rabies in animals.

The results showed a high degree of positivity among domestic/peri-domestic animals viz. dogs, cattle, goats, cats, horses and pigs (Table - 20).

**Table – 20**
**Incidence of rabies among animals during 1992-2001**

| Animals | Clinical | | | Laboratory | | |
|---|---|---|---|---|---|---|
| | Examined | Suspected | % | Suspected | Confirmed | % |
| 1. Dogs | 14949 | 583 | 3.9 | 7763 | 3754 | 48.4 |
| 2. Cats | 72 | 12 | 16.7 | 680 | 149 | 21.9 |
| 3. Cattle | 44338 | 1624 | 3.7 | 1026 | 630 | 61.4 |
| 4. Goats & Sheep | 30306 | 70 | 0.2 | 314 | 153 | 48.7 |
| 5. Horses | 392 | 8 | 2.0 | 120 | 54 | 45.0 |
| 6. Pigs | 305 | 2 | 0.7 | 14 | 7 | 50.0 |
| 7. Monkey | ----- | ----- | ----- | 17 | 1 | 5.9 |
| 8. Camels | 4 | 4 | 100.0 | 6 | 5 | 83.3 |
| 9. Donkey | ----- | ----- | ----- | 2 | 0 | ----- |

Among the wild animals the reservoirs of rabies were mongoose, Jackal and deer (Table - 21). The diagnosis was based mostly on demonstration of Negri bodies by Seller's stain and about 8-10 institutions confirmed it by FAT and biological test.

**Table – 21**
**Incidence of rabies among wild animals[+] during 1992-2001**

| Wild Animals | Clinical | | | Laboratory | | |
|---|---|---|---|---|---|---|
| | Examined | Suspected | % | Suspected | Confirmed | % |
| 1. Mongoose | ---- | ---- | ---- | 112 | 98 | 87.5 |
| 2. Jackal | ---- | ---- | ---- | 14 | 13 | 92.9 |
| 3. Deer | ---- | ---- | ---- | 18 | 11 | 61.1 |
| 4. Bear | 1 | 0 | ---- | 4 | 1 | 25.0 |
| 5. Wolf | 1 | 1 | 100.0 | 8 | 4 | 50.0 |
| 6. Lion | ---- | ---- | ---- | 4 | 3 | 75.0 |
| 7. Fox | ---- | ---- | ---- | 4 | 1 | 25.0 |
| 8. Tiger | ---- | ---- | ---- | 4 | 0 | ----- |
| 9. Leopard | ---- | ---- | ---- | 3 | 0 | ----- |
| 10. Rhino | 1 | 1 | 100.0 | 2 | 1 | 50.0 |
| 11. Panther | ---- | ---- | ---- | 1 | 1 | 100.0 |
| 12. Cheetah | ---- | ---- | ---- | 1 | 0 | ----- |

*+ Some of these were from wild life parks and zoos*

Incidentally, rabies positivity was reported very rarely in rats, rabbits and bandicoots. But as the number of specimens were too small and other relevant information was not available it is apt not to draw any definite conclusions (Table -22).

**Table - 22**
**Incidence of rabies among other species of animals**

| Animals | Laboratory | | |
|---|---|---|---|
| | Suspected | Confirmed | % |
| 1. Rat | 17 | 1 | 5.9 |
| 2. Rabbit | 16 | 1 | 6.3 |
| 3. Squirrel | 10 | ----- | ----- |
| 4. Bat | 2 | 0 | ----- |
| 5. Bandicoot | 1 | 1 | 100.0 |

As dogs and cats accounted for most of human rabies deaths (98%) from the medical survey, the veterinary survey clearly demonstrated the enzooticity of rabies in these animals over a decade (1992-2002) [Table - 23].

**Table – 23**
**Incidence of rabies in canines & felines during 1992-2001**

| Year | Canines | | | | | | Felines | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Clinical | | | Laboratory | | | Clinical | | | Laboratory | | |
| | Exam | Sus. | % | Sus. | Pos. | % | Exam | Sus. | % | Sus. | Pos. | % |
| 1992 | 29 | 8 | 27.6 | 915 | 411 | 44.9 | 2 | 0 | - | 54 | 21 | 38.9 |
| 1993 | 56 | 12 | 21.4 | 948 | 461 | 48.6 | 3 | 0 | 0 | 79 | 14 | 17.7 |
| 1994 | 70 | 9 | 12.9 | 792 | 393 | 49.6 | 2 | 0 | 0 | 76 | 21 | 27.6 |
| 1995 | 60 | 11 | 18.3 | 863 | 376 | 43.6 | 8 | 0 | 0 | 78 | 19 | 24.4 |
| 1996 | 93 | 11 | 11.8 | 737 | 355 | 48.2 | 4 | 1 | 25.0 | 61 | 15 | 24.6 |
| 1997 | 259 | 108 | 41.7 | 770 | 417 | 54.2 | 10 | 0 | - | 60 | 14 | 23.3 |
| 1998 | 4001 | 109 | 2.7 | 731 | 426 | 58.3 | 10 | 0 | - | 66 | 14 | 21.2 |
| 1999 | 3992 | 108 | 2.7 | 719 | 322 | 44.8 | 7 | 4 | 57.1 | 71 | 9 | 12.7 |
| 2000 | 3149 | 107 | 3.4 | 609 | 308 | 50.6 | 13 | 3 | 23.1 | 74 | 15 | 20.3 |
| 2001 | 3240 | 100 | 3.1 | 679 | 285 | 42.0 | 13 | 4 | 30.8 | 61 | 7 | 11.5 |
| **Total** | **14949** | **583** | **3.9** | **7763** | **3754** | **48.4** | **72** | **12** | **16.7** | **680** | **149** | **21.9** |

***Note:*** *Exam - Examined, Sus - Suspected, Pos – Positive.*
***Source:*** *18 Veterinary Colleges and 5 National Institutions*

All these show that the reservoir of rabies is predominantly in dogs and cats and other peri-domestic animals like cattle, goats, horses and pigs; and rarely from wild animals like mongoose, jackal and others.

## 3.4 SURVEY OF THE RABIES FREE AREAS

The rabies free areas of India viz. Islands of Andaman and Nicobar and Lakshadweep were surveyed separately in July and August 2003.

### 3.4.1 The Union Territory of Andaman and Nicobar Islands

The Chief Investigator (Dr. M. K. Sudarshan) with the help and support of the Director of Health Services, Andaman and Nicobar Islands, visited Port Blair, from July 28 to 31, 2003 (4 days) and using the check lists and interview schedule/ survey instrument (Annexure-III, RFV, RFM, RFVM, RFD) held personal discussions (individual/group) with the health, Veterinary, Ports and Wildlife Staff (Table -24).

**Table – 24**
**Coverage of survey in the islands of Andaman & Nicobar**

| Activity | Number |
|---|---|
| I. Institutional Visits | |
| • Directorate of Health Services | 1 |
| • Directorate of Veterinary Services (including Institute of Animal Health) | 1 |
| • Seaport and Airport | 1 each |
| • Wildlife Warden and Mini Zoo | 1 each |
| • Referral Hospital (Medical) | 2+ |
| • Veterinary Hospital (Main) | 1 |
| • Regional Medical Research Centre, ICMR. | 1 |
| II. Personnel Interviewed | |
| a. Health | |
| • Medical | 17++ |
| • Paramedical | 16 |
| b. Veterinary | |
| • Doctors | 13 |
| • Veterinary Inspectors and Others | 14 |
| c. Airport and Seaport | 10 |
| d. Wildlife Office and Zoo | 4 |
| e. Others | |
| • Private Medical practitioners | 2 |
| • Private Pharmacists (Pharmacies) | 11 |

*+ - G. B. Pant Hospital and INHS Dhanvantri, Port Blair*
*++ - Includes one Ayurvedic and Homeopathic Doctor each*

The respondents, particularly those with long tenure of service/natives were preferred and were clearly explained the survey and after taking them into confidence the information was obtained in a free and frank manner. Besides the relevant/ available statistics was obtained from their offices. In addition, whenever relevant inspections/observations were also made.

The Union Territory of Andaman and Nicobar Islands is a group of approximately 572 islands in the Bay of Bengal. Altogether these islands cover a geographical area of 8249 sq. kms, with 86% of tropical rain forest and a population of 3.6 lakhs (2001 census) concentrated mainly on 38 large and small islands. The entire urban population of 100,186 (27.8%) lives in the capital town of Port Blair and its distance from mainland (viz. Chennai and Kolkata) is about 1200 Kms.

### 3.4.1.1 Health and Medical Profile (Table - 25)

The medical and health services/status (Table-25) facilities are fairy well developed. The islands are reportedly free of Rabies, Diphtheria and Poliomyelitis. The locally endemic diseases include Malaria, Tuberculosis, Diarrhoea, Viral Hepatitis, Filariasis and Leptospirosis.

**Table – 25**
**Health care status of the Andaman and Nicobar Islands**

| | |
|---|---|
| Health Institutions | 147 |
| Referral Hospital | 1 |
| CHCs | 4 |
| PHCs | 19 |
| SCs | 107 |
| UHCs | 5 |
| Homeopathy Dispensary | 8 |
| Ayurvedic Dispensary | 1 |
| Doctors | 137 |
| Nurses | 349 |
| Beds (Andaman – 777/Nicobar – 200) | 977 |
| Bed Population Ratio | 1:370 |
| Doctor Population Ratio | 1:2800 |
| Nurse Population Ration | 1:1410 |
| Literacy Rate (2001) | 81% |
| Infant Mortality Rate | 17.3 |
| Birth Rate | 17.8 |
| Death Rate | 3.4 |

***Source:*** *Directorate of Health Services, Port Blair*

### 3.4.1.2 Natural Fauna, Animal Health and Veterinary Services (Tables - 26 to 30)

The natural terrestrial fauna consists of Andaman Wild Pigs, Civet, Crab eating Macque Nicobar monkeys, Deers, Elephants (introduced), Snakes, centipedes etc. The peri-domestic animals include goats, dogs, cattle, buffaloes etc. There are no sheep in the islands. A livestock census revealed a 2.8% increase in dog population over a five-year period (Table-23). The next census is due in 2003.

**Table – 26**
**District-wise livestock census of 1992 and 1997**

| Livestock | 1992 | | | 1997 | | | Increase (%) |
|---|---|---|---|---|---|---|---|
| | Andaman | Nicobar | Total | Andaman | Nicobar | Total | |
| Cattle | 47481 | 5460 | 52941 | 52921 | 7259 | 60180 | 13.6 |
| Buffalo | 14265 | 266 | 14531 | 14155 | 49 | 14204 | – 2.7 |
| Goats | 44555 | 11605 | 56160 | 59487 | 11436 | 70983 | 26.3 |
| Pigs | 1252 | 35212 | 36464 | 3258 | 39578 | 42836 | 17.4 |
| Dogs | 24078 | 4645 | 28743 | 25363 | 4205 | 29568 | 2.8 |
| Horses/ Donkey | ---- | ---- | ---- | 12 | 3 | 15 | ---- |
| Rabbits | ---- | ---- | ---- | 92 | 60 | 152 | ---- |
| **Total** | **131631** | **57188** | **188839** | **155308** | **62590** | **217938** | **15.4** |

***Source:*** *Directorate of Veterinary Services, Port Blair*

The veterinary facilities and manpower is quite well developed (Table - 27).

**Table – 27**
**Status of veterinary facilities in the islands**

| Veterinary Institutions | | | | Veterinary Manpower | |
|---|---|---|---|---|---|
| **Type** | **Andaman** | **Nicobar** | **Total** | **Type** | **Number** |
| Veterinary Hospital | 7 | 2 | 9 | Senior Veterinary Officer | 6 |
| Veterinary Dispensary | 9 | 2 | 11 | Veterinary Assistant Surgeon | 36 |
| Veterinary Sub. Dispensary | 35 | 8 | 43 | **Sub-Total** | **42** |
| Others | 16 | 3 | 19 | Livestock Supervisor | 4 |
| **Total** | **67** | **15** | **82** | Senior Veterinary Compounder | 11 |
| | | | | Veterinary Stockman | 64 |
| | | | | Veterinary Compounder | 71 |
| | | | | Veterinary Dresser | 46 |
| | | | | **Sub-Total** | **196** |
| | | | | **Total** | **238** |

***Source:*** *Directorate of Veterinary Services, Port Blair*

The islands are free of Rinderpest and FMD. In the recent five years, there is an 11.1% increase of animals treated in the veterinary hospitals and 21.7% of particularly dogs, cats and others in the Islands (Table - 28).

**Table – 28**
**Details of animals treated in the Andaman and Nicobar islands during 1998-2003**

| Year | Cattle | Buffalo | Goats | Pigs | Dogs, Cats & Others | Total |
|---|---|---|---|---|---|---|
| 1998-99 | 78520 | 22515 | 53254 | 11452 | 13619 | 179360 |
| 1999-00 | 85897 | 25570 | 58300 | 11966 | 15333 | 197066 |
| 2000-01 | 89855 | 23928 | 58885 | 19716 | 17344 | 209728 |
| 2001-02 | 86274 | 23653 | 56592 | 17262 | 16251 | 200032 |
| 2002-03 | 85289 | 23872 | 55347 | 18776 | 16585 | 199869 |

***Source:*** *Directorate of Veterinary Services, Port Blair*

Likewise even in the urban area of Port Blair a phenomenal 95% of increase in dogs treated (mostly for parasitic diseases and others) was noticed (Table - 29).

**Table – 29**
**Details of animals treated at veterinary hospital, Junglighat, Port Blair during 1998-2003**

| Year | Cattle | Buffalo | Goats | Pigs | Dogs | Others+ | Total |
|---|---|---|---|---|---|---|---|
| 1998-99 | 3515 | 286 | 2020 | 210 | 2509 | 148 | 8688 |
| 1999-00 | 3545 | 244 | 1814 | 223 | 2180 | 208 | 8214 |
| 2000-01 | 3449 | 370 | 2175 | 288 | 3504 | 210 | 9996 |
| 2001-02 | 3484 | 166 | 2691 | 187 | 4742 | 307 | 11577 |
| 2002-03 | 3865 | 231 | 3028 | 152 | 4868 | 275 | 12419 |

*+ - Includes elephant, rabbit, cats etc.*

***Source:*** *Directorate of Veterinary Services, Port Blair*

It is now a common sight of free roaming street dogs in the capital of Port Blair. It is opined that about 80% of dogs in Andaman are strays whereas 20% of dogs in Nicobar are strays. Although rearing of pedigree dogs was limited to very few officials of the defence department in the past, with all the tourist influx of late many have started keeping pet pedigree dogs imported from the mainland. All these must be viewed as a cause for concern as the area is rabies free.

Till the year 2000, the stray dogs control in Port Blair was done using strychnine laced baits; but from 2001 Animal Birth Control programme was introduced (Table - 30).

The progress of ABC is slow and an effective canine control programme is needed. Under the ABC programme the sterilized dogs are not given ARV, which needs to be reviewed.

**Table – 30**
**Animal birth control programme in Port Blair**

| Year | Number of Dogs |
|---|---|
| 2001 (August onwards) | 54 |
| 2002 | 142 |
| 2003 (till July) | 151 |
| **Total** | **347** |

***Source:*** *Veterinary Hospital, Junglighat, Port Blair*

There is also no established surveillance for rabies in dogs/cats and there is no practice of laboratory examination for rabies viz. not even the Negri body examination despite available facilities and this needs to be reviewed.

### 3.4.1.3 Anti-Rabies Vaccination for animals in the Island

There is no practice of anti-rabies vaccination of dogs, cats and other animals in the islands. Sometime back due to pressure from mainland/migrated people a small quantity of anti-rabies vaccine was procured by the Veterinary Services Department, but had to be later stopped due to its increase of demand by many. Currently, there is no practice of either pre or post exposure rabies vaccination of animals by the Veterinary Services Department in the island. Hence, there is no stock of anti-rabies vaccine in the department. Even the veterinarians do not receive/ take pre-exposure rabies vaccination, as they did not perceive any threat of rabies in their vocation.

### 3.4.1.4 Entry/Import of dogs/cats and Quarantine

It was revealed at the Seaport that during January 2002 to July 2003, a total of 7 dogs were brought from the mainland and entered the island without any veterinary examination and documentation. Similarly, at airport about 10 dogs (since January 2003) were brought into the island without any veterinary examination and documentation. There is no system of monitoring of entry of dogs/cats into the island. There is no facility and practice of quarantine of dogs/cats for rabies in the island. All these need immediate attention of the port health authorities and corrective measures.

### 3.4.1.5 Diagnosis of Rabies in the Animals

All the interviewed staff of Veterinary Department strongly opined that the islands are rabies free and they have not suspected of rabies even clinically in the animals. Though facilities for Negri body examination is available in the department and also have an arrangement to send the brain sample for FAT to RDDL, IAH & VB, Kolkata, still due to lack of disease suspicion amongst veterinarians, it has not been put into practice/use. As all received their education/training in rabies endemic mainland veterinary colleges they appeared to be well conversant with the disease. But still no case of rabies in animals was suspected/diagnosed in the past. An extensive discussion with the senior veterinarians suggested that an earliest documentation of rabies free status of the islands is dated back to 1902. Consequently, there is no documentary evidence of rabies in animals in the Veterinary Department.

There were no private practicing veterinarians in Port Blair or in the islands.

### 3.4.1.6 Dog bites and Human Rabies (Table - 31)

The common biting animals were dogs and occasionally the rats, cats, snakes and centipedes. The incidence of dog bites in Port Blair (Table - 31) showed that about 5600 dog bite victims over a period of 5½ years did not receive any anti-rabies vaccine and there was no human rabies deaths in this period or even as early as 1990 as per current records available in the Health Information Cell of Directorate of Health Services. There is no practice of performing autopsies of neurological deaths in the hospital.

**Table – 31**
**Incidence of dog bites in Port Blair, Andaman and Nicobar islands**

| Year | Number |
|---|---|
| 1998 | 1032 |
| 1999 | 884 |
| 2000 | 948 |
| 2001 | 821 |
| 2002 | 1355 |
| 2003 | 576[+] |
| **Total** | **5616** |

***Source:*** *Medical Record Department, G. B. Pant Hospital, Port Blair*

***Note****: 1. Includes cases of G.B. Pant Hospital, 5 Urban Health Centres and 2 Dispensaries*
*2.* ***+*** *- Includes from January to June 2003 (6 Months) only.*

Like in the veterinary services there is no practice even in medical services to use anti-rabies vaccines. Discussions in the DHS revealed that about 7 vials of PCEC vaccine (Rabipur) was used from January 1998 to till date (5½ years) mostly following insistence on its use by bite victims from mainland. Otherwise, there is no stock of anti-rabies vaccine in the medical services of the island. In rare instances it is purchased from the market/mainland (mostly Chennai) and used.

However, in the other main hospital of Indian Navy Health Services (INHS), Dhanvantri, at Port Blair an average of 2 to 3 dog bite victims per month received full 5 to 6 injections of PCEC vaccine (Rabipur) and the vaccine was available on a continual basis.

A survey of private medical practitioners and market private pharmacies revealed that the island/native doctors generally avoid using rabies vaccine (as they believe it is rabies free) whereas those from mainland origin and on insistence of dog bite victims (mainland people) freely used anti-rabies vaccine. A survey of 11 private pharmacies in the main market area revealed that only one pharmacy had a stock of 2 PCEC vaccine (Rabipur) vials. Thus, the use of rabies vaccine in post-exposure rabies prophylaxis was rare.

The isolation ward (14 beds) of G. B. Pant Hospital, Port Blair, has never had a human rabies case in the past. A monthly "NIL Report" is sent along with other communicable diseases reporting format to NICD, Delhi.

#### 3.4.1.7 Conclusion

Based on the above information it may be concluded that:

1. The island is free of human rabies and probably animal rabies despite deficiencies in monitoring of entry of dogs/cats into island, their quarantine and rabies surveillance.

2. The dog population is on the rise with a weak stray control programme and the dogs being non-immune (un-vaccinated) provide a potential reservoir for a possible outbreak of rabies in future.

#### 3.4.1.8 Recommendations

Hence, it is recommended that:

1. The entry of dogs/cats at Seaport/Airport is regulated under a veterinarian with proper records, documentation, quarantine facilities and a system of monitoring and follow up established.

2. The use of anti-rabies vaccine for dogs/cats is recommended under ABC programme and an effective control of stray dog population and licensing of pet dogs is the need of the hour.

3. A separate team of epidemiologist, virologist and a veterinarian may conduct an in depth study in future.

### 3.4.2 The Union Territory of Lakshadweep Islands

Dr. B. J. Mahendra, Coordinator of the survey with the help and support of the Director of the Medical and Health Services, Lakshadweep Islands, visited the Capital Kavaratti, from 04/08/03 to 07/08/03 (4 days) and using the check lists and Interview schedules/survey instruments (Annexure-III, RFV, RFM, RFVM & RFD) held discussions (individual/group) with the Medical, Veterinary, Ports (air & sea), Environment & Forest Staff (Table - 32).

**Table – 32**
**Coverage of the survey in the Lakshadweep islands**

| Activity | Number |
|---|---|
| I. Institutional Visits | |
| • Directorate of Medical and Health Services | 1 |
| • Directorate of Animal Husbandry | 1 |
| • Veterinary Dispensary | 1 |
| • Department of Environment & Forest | 1 |
| • Airport (Cochin & Agatti) | 1 each |
| • Seaport (Kavaratti) | 1 |
| • Indira Gandhi Hospital (Referral Hospital Medical) | 1 |
| II. Personnel Interviewed | |
| a. Health | |
| • Medical | 3 |
| • Paramedical | 6 |
| b. Veterinary | |
| • Doctors | 5 |
| • Others | 1 |
| c. Airport | 2 |
| d. Seaport | 1 |
| e. Department of Environment and Forest | 1 |
| f. Others (Private practitioners) | 1 |

The respondents particularly those with long tenure of Service/Natives were preferred and were clearly explained the survey and after taking them into confidence the information was obtained in a free and frank manner. The relevant/available statistics was obtained from their offices; in addition relevant inspections/ observations were also made.

The Union Territory of Lakshadweep is a group of 11 inhabited Islands in the Arabian Sea, The inhabited area is about 32 Sq. kms, and the population is 62,000. The Capital of Island is Kavaratti, and its distance from mainland viz. Cochin is about 400 kms.

### 3.4.2.1 Medical and Veterinary Infrastructure

The Medical and veterinary infrastructure are fairly well developed and the Islands are reportedly free of Rabies (Table - 33). The locally endemic diseases include acute respiratory infections, acute diarrhoeas, tuberculosis and enteric fever in man.

**Table – 33**
**Medical and veterinary facilities in Lakshadweep**

| Medical | No. | Veterinary | No. |
|---|---|---|---|
| • Hospital | 2 | • Veterinary Hospital | 2 |
| • Ayurvedic Dispensary | 2 | • Veterinary Dispensaries | 7 |
| • Homeopathic Dispensary | 1+ | • Veterinary Sub-centres | 7 |
| • PHCs | 4 | • Veterinary first aid centre | 1 |
| • CHCs | 3 | • Government poultry farm | 1 |
| • Total Beds | 200 | • Poultry Demonstration Unit | 8 |
| | | • Regional Hatchery | 1 |
| | | • Artificial insemination sub-centres | 7 |
| | | • Dairy Demonstration Unit | 1 |
| | | • Slaughter House | 1 |

***Note:*** *+ - Homeopathic Dispensary started during 1986-87*

### 3.4.2.2 Natural Fauna in the Lakshadweep Islands

The Natural Fauna in the Lakshadweep islands are predominantly marine (Coral and Fishes). The terrestrial fauna is mostly domestic animals like the Goat, Cow, Cat (mostly stray). The livestock census is currently being planned. The animal census does not include the count of cats on the islands (Table - 34).

**Table – 34**
**Livestock census of Lakshadweep**

| Livestock | 1972 | 1977 | 1982 | 1987 | 1992 | 1997 | Growth Rate (in %) over 1992 | Annual Compound |
|---|---|---|---|---|---|---|---|---|
| Cattle | 1311 | 1246 | 2601 | 2728 | 2519 | 3399 | 34.93 | 6.99 |
| Sheep | ------ | 288 | ------ | ------ | ------ | ------ | ------ | ------ |
| Goats | 3817 | 4536 | 9863 | 15343 | 16886 | 25521 | 51.13 | 10.22 |
| Other Livestock | 2 | 8 | 1 | 52 | ------ | ------ | ------ | ------ |
| **Total Livestock** | **5130** | **6078** | **12465** | **18123** | **19405** | **28920** | **49.03** | **9.8** |

It is **interesting to note that there are no dogs in the Islands of Lakshadweep**; however, there are cats both pet and free roaming. There is no information available on the number of such cats and the animal census does not include the counting of these animals. There is currently no Animal Birth Control (ABC) programme for the cats on the Islands. There is no established surveillance for rabies in cats and there is currently no Laboratory examination for rabies in the Islands, which needs review.

### 3.4.2.3 Anti Rabies Vaccination for the animals in the Islands

There is no practice of anti-rabies vaccination of the cats or other animals on the Islands. The Import of Dogs is not allowed and there have been instances in the past where cats were imported but these cats were vaccinated on the mainland before import as per the information provided by the veterinary officers.

### 3.4.2.4 Entry/Import of animals (dogs/cats) and Quarantine

Enquiries at the Cochin Airport with the Duty Manager and the Doctor attached to the Airport revealed that the Indian Airlines is the only operator flying to the Lakshadweep Islands, The airline does not transport any live animal to the Islands. The Assistant Port Master at Kavaratti mentioned that there was no instance of import of Dogs into the Islands but there have been instances of import of cats to the Island. There is no system of monitoring the entry of animals other than registration at the port of embarkation. There is no established facility or practice of Quarantine of animals in the islands, which needs the immediate attention of the authorities.

### 3.4.2.5 Diagnosis of rabies in the animals

All the veterinarians interviewed strongly opined that the islands are Rabies free and that they have not suspected rabies in any of the animals on the islands and the Islands do not have any dog population at all. All the Veterinarians informed of

the facility of diagnosis, which was available on the mainland and they also informed this was not used as they did not suspect Rabies in the animals examined by them. One of the veterinarians did mention of a person presenting with a cat bite but the biting animal was healthy and hence no treatment was offered nor was the case referred to the medical authorities (however, despite best efforts the documentation of the case was not available, the case was said to have been seen in 1999/2000).

The islands have been rabies free since time immemorial and the authorities say there has not been any evidence of rabies in the Islands. There are no private practicing veterinarians on the Islands.

#### 3.4.2.6 Animal Bites and Human Rabies

Animal bites from warm-blooded animals are an extreme rarity on the Islands, Fish bites are common and bites by cats were not treated in the hospital as per the records examined. Only a Veterinarian gave information of a cat bite, which did not receive any rabies prophylaxis. There is an Isolation ward in the Indira Gandhi Hospital, however the staff here mentioned that they have never seen a case of human rabies in the ward. The authorities are reporting "nil" cases of human rabies to the higher-ups since 1991 as per the records available; however, the authorities mention that they have not seen a single case of Rabies on the Island nor have heard of such a case.

The medical authorities mentioned that in 1998, 5 doses of PCEC (Rabipur) were imported from the mainland to treat a case where the person was bitten by a dog on the mainland. There are no private pharmacies in Kavaratti.

One private practitioner of the two practitioners on the Island was available for interview and he mentioned that he had not seen a case of an animal bite from a warm-blooded animal and that he has not used rabies vaccines in his practice.

#### 3.4.2.7 Conclusions

Based on the above observations and the information gathered it may be inferred that:

1. The Islands of Lakshadweep are Rabies Free.
2. There is no documented information available on the cat population in the Islands.
3. Surveillance activities and Quarantine are deficient.

#### 3.4.2.8 Recommendations

Hence, it is recommended that:

1. The entry of animals at Sea/Airports is regulated under a Veterinarian with proper documentation, records, and Quarantine facilities with a system of monitoring and follow-up.
2. A systematic activity of assessing the cat census and their population control activities need to be taken up.
3. A more detailed in depth study of rabies free status may be taken up in future (along with Andaman & Nicobar Islands).

## 3.5 BURDEN OF RABIES IN INDIA

Based on the results of this survey the following indicators and figures are estimated and projected for use at national level, assuming that the situation and related factors of dog population, bite incidence, rabies incidence, etc., are the same in the country as it is in the population/ areas surveyed in the study.

### 1. Human Rabies Deaths

- Annual Incidence: 17,137 (14,109 to 20,165 with 95% confidence). An addition of 20% to include paralytic/atypical form of rabies provides an estimation of 20,565.
- Principal Animal Reservoir: Dog (96.3%).
- Frequency of Human Rabies Deaths: 1 per 30 minutes (1/2 hour) approx.

As the population surveyed for animal bite incidence is a part of / closely linked to the population searched for human rabies incidence, consequently, a data linkage was also done to workout some rates / indices.

### 2. Animal bite load

- Pet dog : Man ratio = 1 : 36
- Pet/Owned/Household dog population : 28 million.
- Annual animal bite incidence rate (per 1000 population) : 17.4.
- Projected annual incidence (for 1 billion population) : 17.4 million.
- Frequency of bite: 1 per 2 seconds.
- Annual man-days lost for animal bite: 38 million.
- Annual medicinal (Vaccines + Other drugs) cost for animal bite treatment: Rs. 2 billion approx.

The above information summarizes the current scenario of rabies in India and it could be used suitably for advocacy for Prevention and Control of Rabies in the country.

# 4. CONCLUSIONS

1. Human Rabies is endemic throughout the mainland and only the islands of Andaman & Nicobar and Lakshadweep are rabies free. Majority of the human rabies deaths occurred in adults, males and in poor/low income group. The principal animal responsible for rabies transmission was dog. The use of rabies vaccination was low and that of rabies immunoglobulins was negligible.

   Majority of human rabies deaths occurred within six months of dog bite. The limbs and hands were the most common sites of bite. About half of the human rabies cases sought hospitalization and about one-third died in the hospital. The indigenous treatment was a popularly sought after remedy. The diagnosis of human rabies was mostly on clinico-epidemiological basis and hence were mostly "probable cases" and none had laboratory confirmation of diagnosis.

2. The incidence of animal bite is high and is due to a high dog: man ratio. The majority of animal bite victims belonged to lower economic class and the use of anti-rabies vaccines was low.

   The presence and menace of stray dogs was high. The pet dog care and management practices were not satisfactory. The municipal licensing of pet dogs was inadequate. Overall the situation was slightly better in urban areas as compared to rural areas.

3. The most common animal reservoirs of rabies based on laboratory evidence were dogs, cattle, goats, cats and pigs and among the wild animals were mongoose and jackal.

# 5. RECOMMENDATIONS

Based on the results of the survey and the final conclusions drawn the following recommendations are made.

1. The coverage and usage of modern rabies vaccines and rabies immuneglobulins needs to be improved. There is an urgent need to phase out NTV and phase in cost-effective intradermal TCV to prevent human rabies deaths.

2. A census of dogs or a scientific estimation of dog population is needed. There is an urgent need to tackle the menace of stray dog population on a war footing. More effective municipal licensing of pet dogs and awareness campaigns for better and responsible dog care and management practices is needed.

3. Efforts are needed to improve hospital care and management of human rabies patients and a beginning to be made for laboratory confirmation of rabies in a few centres.

4. Similarly on the veterinary side there is a need to upgrade the facility of rabies diagnosis by FAT which is a more sensitive and specific test than Negri body examination.

5. There is an urgent need to introduce effective monitoring of entry of dogs/ cats into the islands of Andamans and Lakshadweep at the airports and seaports and to ensure a proper surveillance of rabies in animals.

For initiating all the above measures and for a concerted and coordinated action a "**National Rabies Elimination Programme**" must be launched involving medical, veterinary and other related departments.

# ANNEXURES

# ANNEXURE – I

## ABOUT APCRI

The Association for Prevention and Control of Rabies in India (APCRI) was founded in 1998 and is registered as a scientific society under the Karnataka Societies Registration Act S-No. 439, 2000-01. It is an association of Professionals, Scientists and others who are committed to the elimination of rabies from India. The Association is committed to the goal of achieving "**Rabies Free India**" by 2020.

### ❑ OBJECTIVES

- Promote coordination and interaction amongst all those working for rabies prevention and control.
- Organize scientific seminars, meetings, conferences, workshops, surveys etc.
- Publish and disseminate information on rabies.
- Liaise, influence and advocate with Governments for initiating measures for rabies prevention and control.
- Promote research in the field of rabies.
- Initiate measures for achieving the goal of "Rabies Free India".

### ❑ MEMBERSHIP

The categories of membership include Patron Member, Donor Member, Life Member, Associate Member and Honorary Fellows/Members.

### ❑ COMMITTEE

The General Control, Management and direction of the policy and affairs of the association is vested with the Executive Committee, which comprises of Seventeen Members viz. President, Vice Presidents (2), Secretary General (1), Joint Secretary (1), Editor (1), Treasurer (1), and Zonal Representatives (10) two each from North, East, Central, West and South Zones of the Country.

## ❑ MAJOR ACTIVITIES TILL DATE

- 1st National Conference on Rabies held on 25th July 1999 at Calcutta, West Bengal.
- 2nd National Conference on Rabies held on 7th & 8th July 2000 at Bangalore, Karnataka.
- National Workshop for Key trainers of APCRI (for training medical professionals and others in the country) held on 31st March 2001 at National Institute of Mental Health & Neurosciences (NIMHANS), Bangalore.
- 3rd National Conference on Rabies held on 6th & 7th July, 2001 at Amritsar, Punjab.
- 4th National Conference on Rabies held on 6th & 7th July, 2002 at Jaipur, Rajasthan.
- National Seminar on Intradermal Rabies Vaccination, 25th February 2003, KIMS, Bangalore.
- WHO Sponsored National Rabies Survey 2003 (Ongoing).
- 5th National Conference on Rabies APCRICON '2003, on 5th & 6th July 2003 at Bhubaneshwar, Orissa.
- Regular publication of APCRI Journal (5 Nos.) and News Letter (3 Nos.) till date.
- Production and Distribution of Scientific education material on rabies 2 x 2 Projection Slides and Floppy (for PowerPoint Presentation) for use by medical and veterinary professionals.
- Periodic professional update seminars and SOS Public Awareness campaigns through mass media and press.
- Participation in National, International and WHO Expert Committee meetings.

## ❑ ACHIEVEMENTS AND AWARDS

APCRI was honoured with "Chiron Vaccines Award 2000" for its contribution to Prevention and Control of Rabies in India. The award was presented by Dr. H. Koprowski at an International Conference on Rabies held in November 2000 at Bangkok. Dr. B. J. Mahendra, Secretary-General, received the award on behalf of the association.

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| Dr. G. Mukadham | Dr. A. Chaturvedi | |

**Corporate Members**

| | | |
|---|---|---|
| Mr. R. K. Suri | Mr. Ripan Puri | Mr. Sudheendra Kulkarni |
| Mr. Masood Alam | Mr. Dinar Kumar | Mr. O. P. Arya |
| Mr. Ajit Kumar | Mr. V. S. Venkatesh | |
| Mr. A. S. Mathur | Mr. Ashish Patel | |

# APCRI RESOLUTION

**Urges Government of India to -**

- Strengthen rabies surveillance system.
- Accelerate phasing out of Nerve Tissue Vaccine (Sheep brain Semple Vaccine) from the Government sector and replace it with modern vaccines by 2005.
- Introduce Intra-dermal regimen of vaccination.
- Implement effective canine rabies control activities.
- Conduct professional training and public awareness campaign.
- Ensure intersectoral coordination amongst Medical, Veterinary, Urban and Rural Development and Environmental Departments.
- To launch national rabies elimination programme.
- To achieve the Goal of Rabies Free India by 2020.

**Registered Office**

Department of Community Medicine
Kempegowda Institute of Medical Sciences
College, (3rd Floor), K.R. Road
Bangalore - 560 004
Karnataka State. INDIA

**Headquarters**

K-10, Krishnapuri
Malaviya Nagar
Jaipur - 302 017
Rajasthan
INDIA

# ANNEXURE – II

## LIST OF PRINCIPAL INVESTIGATORS, MEDICAL COLLEGES AND THEIR LOCATION (INDIA MAP)

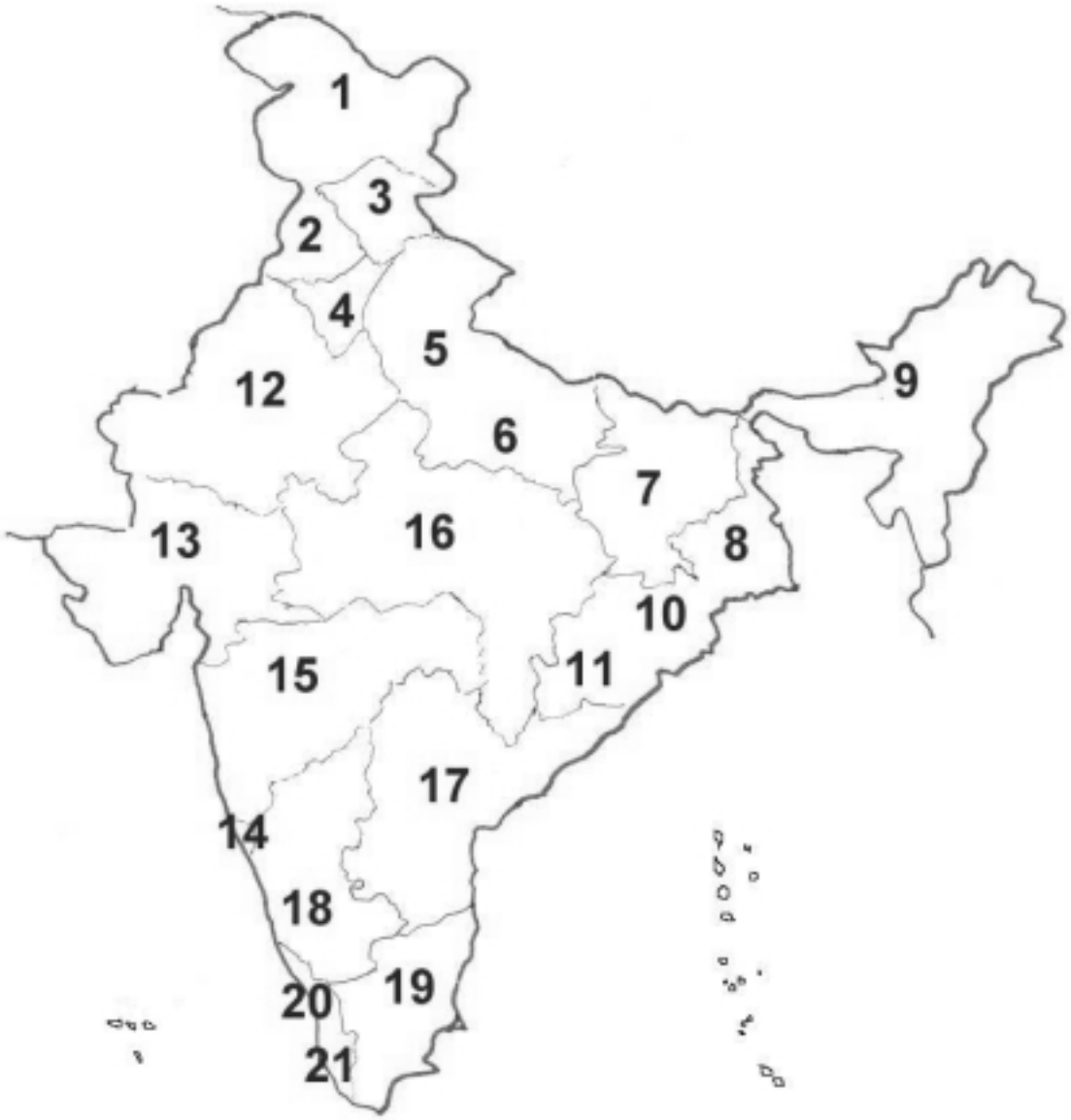
- **Dr. M. K. Sudarshan, Chief Investigator, APCRI, KIMS, Bangalore.**
- **Dr. B. J. Mahendra, Coordinator, APCRI, KIMS, Bangalore.**

1. Dr. Bhupinder Singh, Govt. Medical College, Jammu, Jammu & Kashmir.
2. Dr. S. S. Deepti, Govt. Medical College, Amritsar, Punjab.
3. Dr. Ashok Bharadwaj, IGMC, Shimla, Himachal Pradesh.
4. Dr. (Mrs.) Vijay Grover, UCMS, New Delhi.
5. Dr. Deoki Nandan, SNMC, Agra, Uttar Pradesh.
6. Dr. V. M. Gupta, IMS, BHU, Varanasi, Uttar Pradesh.
7. Dr. Chittaranjan Roy, DMC, Dharbhanga Medical College, Bihar.
8. Dr. Samir Das Gupta, NRSMC, Kolkata, West Bengal.
9. Dr. Sajida Ahmed, GMC, Guwahati, Assam.
10. Dr. Trilochan Sahu, MKCGMC, Behrampur, Orissa.
11. Dr. B. Mohapatra, SCBMC, Cuttack, Orissa.
12. Dr. A. K. Bharadwaj, SMSMC, Jaipur, Rajasthan.
13. Dr. J. P. Mehta, MPSMC, Jamnagar, Gujarat.
14. Dr. Amit Dias, GMC, Bambolim, Goa.
15. Dr. M. B. Khamgaonkar, GMC, Nagpur, Maharashtra.
16. Dr. Sunil Nandeshwar, GMC, Bhopal, Madhya Pradesh.
17. Dr. J. Ravikumar, OMC, Hyderabad, Andhra Pradesh.
18. Dr. N. R. Ramesh Masthi, KIMS, Bangalore, Karnataka.

19. Dr. Roseline Fathima William, RMMC, Chidambaram, Tamilnadu.

20. Dr. M. Jayakumary, AMS, Kannur, Kerala.

21. Dr. Nileena Koshy, MC, Thrissur, Kerala.



# ANNEXURE – III

## NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003
## SCHEDULES

### MEDICAL

| | |
|---|---|
| **S - 1 :** | **Community Survey Form**<br>• Use in the community visited. |
| **S - 2 :** | **Household Survey Form**<br>• Use in the community visited for household interviews |
| **S - 3 :** | **10 Year Hospital Statistics**<br>• Use in the isolation hospital/ward. |
| **S - 4 :** | **Line Listing of Hospital Rabies Deaths 2002-2003**<br>• Use in the isolation hospital/ward for line listing index cases |
| **S - 5 :** | **Rabies Death Search in Community**<br>• Use in the health centre having index case of human rabies. |
| **S - 6 :** | **Human Rabies Case Form**<br>• Use in the household for rabies death information. |
| **S - 7 :** | **Line Listing of Human Rabies Deaths Detected in the Community**<br>• Use in the medical college at the end of survey. |
| **S - R :** | **Survey Summary Report**<br>• Use in the medical college at the end of survey. |

### VETERINARY

| | |
|---|---|
| **S - V :** | **Veterinary Survey Formats**<br>• Use by Commonwealth Veterinary Association in Veterinary Colleges. |

### RABIES FREE AREAS

| | |
|---|---|
| **RF-V :** | **Veterinary Checklist**<br>• Use in Andaman & Nicobar and Lakshadweep Islands. |
| **RF-M :** | **Medical Checklist**<br>• Use in Andaman & Nicobar and Lakshadweep Islands. |
| **RF-VM :** | **Veterinary and Medical Checklist (Itemised)**<br>• Use in Andaman & Nicobar and Lakshadweep Islands. |
| **RF-D :** | **Survey Instrument**<br>• Use in Andaman & Nicobar and Lakshadweep Islands. |

**NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003** **S – 1**

**A Community Survey of Animal bites, Anti-rabies Treatment, Dog Population and Rabies (100 households per community).**

**COMMUNITY SURVEY FORM**

State: _____ Place: _____

Urban ( ) Rural 1 ( ) 2 ( ) 3 ( )

Medical College: _____

Principal Investigator: _____

## I. GENERAL PARTICULARS

Population of the area surveyed _____ Estimate ( ) Census ( )

Surveyors (1) _____ (2) _____ (3) _____ (4) _____

Date of Survey: _____ Starting Time: _____ Closing Time: _____

Duration _____ (minutes).

Households surveyed _____ (Target 100).

## STEPS

1. Visit the community place with a local accomplice (from civic agency, preferably health department). Follow the standard WHO-EPI survey guidelines during fieldwork.
2. After introductions, go to the centre place and randomly chose a direction.
3. Choose the first house randomly and interview (and observe) and record the observations on a schedule.
4. Record information from only cooperative households having a reliable, responsible and adult respondent (s).
5. Visit every tenth house thereafter and interview the households and continue till 100 households are completed.
6. Skip locked houses, uncooperative, unreliable households, shops and other non-residential dwellings.
7. Use HB Pencil, Eraser, Sharpener, Clipboard and the survey forms only after briefing by Principal Investigator.

**NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003** **S – 2**

## HOUSEHOLD SURVEY FORM

State: _____Medical College: _____

Urban ( ) Rural 1 ( ) 2 ( ) 3 ( ) Principal Investigator: _____

Surveyors (1) _____ (2) _____ (3) _____ (4) _____

Date: _____ Household No.: _____ (1 - 100). Village/Ward _____

### I. SOCIO-DEMOGRAPHIC DATA

1. Name of Informant: _____2. Age (yrs): _____
3. Sex: Male ( ) Female ( ) 4. Education _____
5. Address: _____
   _____
   Landmark: _____ 6. Phone No.: _____
7. Household Size (Nos.) _____ Adults: ____ Children (<14 yrs): _____
8. Occupation of head of household: Professional ( ) Service ( )
   Business ( ) Self-employed ( ) Agriculture ( ) Labourer ( )
   Others (specify) _____
9. Total Family Income (monthly): < Rs.1000 ( ) Rs. 1001 to 5000 ( )
   Rs. 5001 to 10,000 ( ) > Rs.10,000 ( ) Comments (if any) _____

### II. DOG (PET) POPULATION DATA

1. Do you have pets in your household ?.
   Yes ( ) No ( ) If yes, Dog ( ) Cat ( ) Others (specify) _____
   Dog: Number: ___ Duration: ___ yrs. Cat: Number: ___ Duration: ___ yrs.
   Dog: Veterinary Consultation: Yes ( ) No ( ) _____
   Dog: ARV given: Yes ( ) No ( ) _____
   Dog collar: Yes ( ) No ( ) _____
   Dog leash: Yes ( ) No ( ) _____
   Dog notice: Yes ( ) No ( ) _____
   Dog: Civic/Municipal license: Yes ( ) No ( ) _____
2. Are there stray dogs in your immediate neighbourhood ?. Yes ( ) No ( )
   - Are they aggressive/attacking people: Yes ( ) No ( ) Not Applicable ( )

### III. ANIMAL BITE DATA (HOUSEHOLD MEMBERS ONLY)

1. In the last one year (from the date of this survey) whether any member(s) of your household had any animal bite ? Yes ( ) No ( ), if yes

## Case - 1

(a) Name: _____ Age (yrs): _____ Sex: M ( ) F ( )

- Biting Animal: Dog ( ) Cat ( ) Others (specify) _____
- Pet ( ) Stray ( ) Wild ( ) _____
- Alive ( ) Died ( ) Killed ( ) Unknown ( )
- Anti-Rabies Treatment done:
  - Wound Treatment (Soap & Water) done: Yes ( ) No ( )
  - Local applicants applied (specify) _____ No ( )
  - Vaccine taken: Yes ( ) No ( ) If yes, NTV ( ) TCV ( ) Number _____
  - RIG taken: Yes ( ) No ( ) If yes, HRIG ( ) ERIG ( )
  - Source of treatment: Govt. ( ) Private ( ) Others (specify) _____
  - Distance (in Kms.) travelled per visit: _____ Not applicable ( )
  - Total visits (specify number) _____ Not applicable ( )
  - Total cost of medicines viz. ARVs, RIGs, etc. (Rs.) ____ Not applicable ( )
  - Any indigenous treatment done ?. Yes ( ) No ( ) If Yes (specify) _____
  - Total days of leave/loss of work _____ Not Applicable ( )

- **WHO Classification of exposure to rabies (Refer WHO text provided):**

  Possibly exposed ( ) Exposed ( ) _____

(a) Name: _____ Age (yrs): _____ Sex: M ( ) F ( )

- Biting Animal: Dog ( ) Cat ( ) Others (specify) _____
- Pet ( ) Stray ( ) Wild ( ) _____
- Alive ( ) Died ( ) Killed ( ) Unknown ( )
- Anti-Rabies Treatment done:
  - Wound Treatment (Soap & Water) done: Yes ( ) No ( )
  - Local applicants applied (specify) _____ No ( )
  - Vaccine taken: Yes ( ) No ( ) If yes, NTV ( ) TCV ( ) Number _____
  - RIG taken: Yes ( ) No ( ) If yes, HRIG ( ) ERIG ( )
  - Source of treatment: Govt. ( ) Private ( ) Others (specify) _____
  - Distance (in Kms.) travelled per visit: _____ Not applicable ( )
  - Total visits (specify number) _____ Not applicable ( )
  - Total cost of medicines viz. ARVs, RIGs, etc. (Rs.) ____ Not applicable ( )
  - Any indigenous treatment done ?. Yes ( ) No ( ) If Yes (specify) _____
  - Total days of leave/loss of work _____ Not Applicable ( )

- **WHO Classification of exposure to rabies (Refer WHO text provided):**

  Possibly exposed ( ) Exposed ( )

[Note: For additional bite/exposure cases use additional Xeroxed sheets and enclose].

## NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

**S – 3**

## 10-YEAR HOSPITAL STATISTICS OF RABIES DEATHS

Hospital: _____

Category: IDH ( ) MCH ( ) DH ( )
Others (specify) _____

Phone No.: _____ Fax No.: _____

Medical Superintendent: _____ Date: _____

| YEAR | CASES* | Deaths* | DAMA* |
|---|---|---|---|
| **1992** | | | |
| **1993** | | | |
| **1994** | | | |
| **1995** | | | |
| **1996** | | | |
| **1997** | | | |
| **1998** | | | |
| **1999** | | | |
| **2000** | | | |
| **2001** | | | |
| **2002 (if available)** | | | |
| **Total** | | | |

Note: a. IDH = Isolation Hospital MCH = Medical College Hospital

DH = District Hospital (Choose the most reliable anyone hospital in the region)

b. Indicate years duration: January to December ( )
or April to March ( ) or otherwise _____

c. * Cases = Number of human rabies patients; Deaths = Died in hospital;
DAMA = Discharged Against Medical Advice.

Principal Investigator: Name: _____

State/Medical College: _____

Signature:_____

**S – 4**

## NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

## LINE LISTING OF INDEX CASES FROM THE ISOLATION HOSPITAL/WARD FOR THE COMMUNITY SEARCH/SURVEY [3 MOST RECENT RABIES DEATHS FROM URBAN AREA & 5 FROM NEARBY RURAL AREAS] {IN 2002-2003, PREFERABLE}

State: _____ Medical College: _____

City: _____ Isolation Hospital/Ward (Specify)_____

Principal Investigator: _____ Source: _____

| | Name | Age/ Sex | Parent/Spouse Name | Address | Landmarks/ Location | DOA | DOD/ DAMA | Name of Hea Centre/Institu |
|---|---|---|---|---|---|---|---|---|
| **URBAN +** | | | | | | | | |
| **1.** | | | | | | | | |
| **2.** | | | | | | | | |
| **3.** | | | | | | | | |
| **RURAL +** | | | | | | | | |
| **1.** | | | | | | | | |
| **2.** | | | | | | | | |
| **3.** | | | | | | | | |
| **4.** | | | | | | | | |
| **5.** | | | | | | | | |

***Note:*** 1. + Atleast 1 death (out of 3 listed) from urban area and 3 deaths (out of 5 listed) from rural areas through the jurisdiction Health Centre (Use S - 5 form) must be visited at household level and all details obtained (Use S - 6 form).

2. Stop the survey only when the target population coverage is reached by active community search viz. 1.25 lakh urban population and 3.75 lakh rural population per medical college (S-5 Forms) and atleast 1 case from urban area and 3 cases from rural area (S-6 Forms) are covered.

**NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003** **S – 5**

## RABIES DEATH SEARCH IN COMMUNITY
## (3* YEARS RECALL FOR URBAN & 5* * YEARS RECALL FOR RURAL)

### Visit to Health Centre having Index Case of Human Rabies

State: _____ Medical College: _____

Principal Investigator: _____

| Health Centre | Urban / Rural | Population Coverage | X | 3 or 5 year recall period | Enquire with HC Staff (MOH) [Write Names] | Rabies+ Deaths |
|---|---|---|---|---|---|---|
| 1. | | | X | 3* or 5** | | |
| | | Total: | | | | |

a. Verify available Death reports/records _____ b. Enquire from Other key informants viz. Anganwadi workers, School Teachers, Village Leaders, Faith healers, etc

### Line Listing of all Rabies Deaths+ in the health centre visited (in the last 3 years in the urban and 5 years in rural).

| | Name | Age/ Sex | Parent/ Spouse | Address/ Village | Landmark/ Location | Contact Person |
|---|---|---|---|---|---|---|
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4, | | | | | | |

Date(s) Visited _____ Comments _____

***Note:***

1. + Visit all these households and collect information on S-6 forms for each case including index case obtained from Isolation Hospital/Ward.
2. The MOH of the Health centre to activate the search for other unreported cases of rabies deaths in the community (in the last 3 years in urban/last 5 years in rural) using local informants in March - April 2003.
3. Use separate Xerox copies for each health center visited.

## NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

**S – 6**

## HUMAN RABIES CASE FORM

State: _____ Medical College: _____
Urban ( ) Rural ( ) Ward/Zone/Village: _____
UHC/PHC _____ Medical Officer _____
Population: _____ Date:_____
Principal Investigator: _____
Surveyors (1) _____ (2) _____ (3) _____ (4) _____

### I. General Particulars (of deceased case in the last 3 years in urban areas/ 5 years in rural areas, from the date of this survey)

1. Household Informant: Name: _____ Age (yrs) _____ Sex:_____
   Education: _____ Relationship to case _____
   Address:_____
   _____
   Landmark: _____ Phone No.: _____

2. Name of deceased (rabies death) _____
   Date of death (DD/MM/YY) _____

3. Age (yrs) _____ Sex: M ( ) F ( )

4. Education: Illiterate ( ) Below 7th Standard ( ) High School ( )
   College ( ) Graduate ( ) Postgraduate ( )
   Professional Degree ( ) Others (specify) _____

5. Occupation: Profession ( ) Service ( ) Business ( )
   Self-employed ( ) Agriculture ( ) Labourer ( )
   Others (specify) _____

6. Total Family Income (Monthly): < Rs.1000/- ( ) Rs.1001 to 5000/- ( )
   Rs.5001 to 10,000 ( ) > Rs.10,000 ( ) Comments, if any _____.

### II. Particulars of Exposure

1. Biting Animal: Dog ( ) Cat ( ) Others (specify) _____

2. Status of Animal:

   (a) Alive ( ) Died ( ) Killed ( ) Unknown ( )
   (b) Pet ( ) Stray ( ) Wild ( ) Others ( )
   (c) Number of people bitten by same animal _____

3. Bite particulars: Head ( ) Trunk ( ) Upper limb ( ) Hands ( ) Lower limb ( )
   Genitalia ( ) Others (specify) _____

4. Number of bite wounds _____

5. Wound Treatment (Soap & Water) done: Yes ( ) No ( ) Don't know ( )

6. Vaccine Treatment: Yes ( ) No ( ) Don't know ( ) If yes,
   (a) NTV ( ) TCV ( ) No. of injections _____
   (b) Source of Treatment: Govt. ( ) Private ( )
   (c) Time interval between bite and starting anti-rabies vaccination: _____ days.

7. RIG (ARS) taken: Yes ( ) No ( ) Don't know ( )

8. Any indigenous treatment done: Yes ( ) No ( ) Don't know ( )
   If yes details _____

## III. Particulars of Hydrophobia

1. Date of onset of symptoms of Rabies (DD/MM/YY) _____ (Fill as feasible)

2. Time interval between bite and onset of hydrophobia: _____ days.

3. Symptoms seen:
   a) Hydrophobia: Yes ( ) No ( ) Don't know ( )
   b) Aerophobia: Yes ( ) No ( ) Don't know ( )
   c) Photophobia: Yes ( ) No ( ) Don't know ( )
   d) Paresis/Paralysis: Yes ( ) No ( ) Don't know ( )
   e) Others (specify) _____

4. (a) Medical Consultation: Yes ( ) No ( ) Specify: _____
   (b) Hospital admission: Yes ( ) No ( ) _____
   If yes, Govt. ( ) Private ( ) Specify _____

5. Duration of survival (in days) _____

6. Place of Death: Hospital ( ) House ( ) Transit ( )

7. Postmortem Report (if any): Yes ( ) No ( ) _____

8. Death Report (Hospital): Yes ( ) No ( ) _____

9. Death Certificate: Yes ( ) No ( ) _____

- **WHO Classification of case (Refer WHO Text provided):**

  Suspected ( ) Probable ( ) Confirmed ( ) _____

Names of Investigator (s) and Signatures — Local Informants & Designation

1. _____ _____
2. _____ _____
3. _____ _____
4. _____ _____

Enclosures (Description)[as evidence of rabies]

1. _____ (Pages_____)
2. _____ (Pages_____)
3. _____ (Pages_____)
4. _____ (Pages_____)

# NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

**S – 7**



**STATE** _____ **MEDICAL COLLEGE** _____ **PRINCIPAL INVESTIGATOR** _____ **FAX:** _____

## LINE LISTING OF HUMAN RABIES DEATHS

| Sl. No. | Name | Age/Sex | DOD | Ward+ | | Zone+ | | UHC+ | | Village+ | | PHC+ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Name | Population | Name | Population | Name | Population | Name | Population | Name | Population |
| **URBAN** | | | | | | | | | | | | | |
| 1 | | | | | | | | | | X | X | X | X |
| 2 | | | | | | | | | | X | X | X | X |
| 3 | | | | | | | | | | X | X | X | X |
| 4 | | | | | | | | | | X | X | X | X |
| 5 | | | | | | | | | | X | X | X | X |
| 6 | | | | | | | | | | X | X | X | X |
| 7 | | | | | | | | | | X | X | X | X |
| 8 | | | | | | | | | | X | X | X | X |
| **RURAL** | | | | | | | | | | | | | |
| 1 | | | | X | X | X | X | X | X | | | | |
| 2 | | | | X | X | X | X | X | X | | | | |
| 3 | | | | X | X | X | X | X | X | | | | |
| 4 | | | | X | X | X | X | X | X | | | | |
| 5 | | | | X | X | X | X | X | X | | | | |
| 6 | | | | X | X | X | X | X | X | | | | |
| 7 | | | | X | X | X | X | X | X | | | | |
| 8 | | | | X | X | X | X | X | X | | | | |
| 9 | | | | X | X | X | X | X | X | | | | |
| 10 | | | | X | X | X | X | X | X | | | | |

\+ Provide information as much as possible and as relevant for estimating the disease burden.
Please fax this to: Dr. M. K. Sudarshan, APCRI, KIMS, Bangalore at 080-26613225 at the earliest (before 25th May 2003, requested).

Date: _____

Principal Investigator
(Name & Signature)

## NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

**S – R**

### SURVEY SUMMARY REPORT

State _____ Medical College _____

Director / Dean / Principal _____

HOD of PSM / Community Medicine _____

Principal Investigator _____

DATES OF SURVEY (DURATION) _____

### SURVEY ABSTRACT

Communities Surveyed: Urban _____ Rural _____ Total _____

Households Surveyed: Urban _____ Rural _____ Total _____

Animal bite cases: Urban _____ Rural _____ Total _____

Hospital Statistics: 10-year Period (Rabies Deaths)_____

Extended Community Survey (For Rabies Death & Search)

Urban: Health Centres _____ Population _____ Cases _____

Rural: Health Centres _____ Population _____ Cases _____

Total : Health Centres _____ Population _____ Cases _____

### CHECK LIST (ENCLOSURES)

Community Survey forms (S-1): Urban-1 _____
Rural-3 _____

Household Survey forms (S-2): Urban 100 _____
Rural 300 _____

10-year Hospital Statistics (S-3): _____ Pages.

Line Listing of Hospital (S-4) Rabies deaths (Index cases) _____Pages.

3 years/5 years (Rabies Deaths) Search in Community (S-5) _____Pages.

Human Rabies (Deaths) Case forms (S-6) _____ Pages.

Line listing of human rabies deaths in the community (S - 7) _____ Pages.

## FINANCIAL REPORT

ADVANCE RECEIVED: Rs. _____

AMOUNT SPENT: Rs. _____

BALANCE AMOUNT: Rs. _____
(To be refunded)

***Note:***

- Enclose all vouchers duly signed by Pr. Investigator / HOD / DEAN.
- Enclose a statement of Expenditure (1 Page) under the specified heads (Separate format provided).
- Enclose the balance amount payable (if any) as DD payable on Bangalore drawn in favour of "APCRI" and send it by Regd. Post to Dr. B.J. Mahendra, Secretary General, APCRI, Department of Community Medicine, KIMS College, 3rd Floor, Bangalore - 560 004.

## WHO & APCRI: NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

## GUIDELINES TO PRINCIPAL INVESTIGATORS

Suggested Norms of Expenditure of survey grant (Rs. 20,000/- paid in advance)

| Head | Amount | Remarks |
|---|---|---|
| 1. Travel Expenses | Rs.6000/- | College Jeep and Van |
| 2. Stationary, Xerox, etc. | Rs.1000/- | Schedules, Clipboards, Pencil, Eraser, Sharpener, etc. |
| 3. Communications & Postage | Rs.1000/- | Phone, Stamps, Courier, Email, Fax, etc. |
| 4. Per Diem<br>• MC survey team<br>• HC Medical Officers (4)<br>• Community Informants | <br>Rs.7000/-<br>Rs.2000/-<br>Rs.2000/- | <br>@ Rs. 500 x 4 MOs approx.<br>@ Rs. 200 per case+ approx |
| 5. Miscellaneous | Rs.1000/- | Contingency expenses |

+ Out of this Rs. 100/- is paid to MOH (UHC/PHC) for validation of field/lay diagnosis.

***Note:***

At the end of data collection and fieldwork, prepare a statement of expenditure under above heads enclosing all relevant vouchers and send it to Dr. B. J. Mahendra, Secretary-General (Format enclosed).

**P.S.: On receipt of the survey forms and found satisfactory in all aspects (and the statement of expenditure duly signed by HOD & Principal/ Dean) an amount of Rs. 5000/- (lump sum) will be paid to Principal Investigator as Per Diem covering all expenses incurred.**

## WHO & APCRI: NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

State _____ Medical College _____

Principal Investigator _____

### STATEMENT OF EXPENDITURE

1. Travel Expenditure Rs. _____
2. Stationary, Xerox, etc. Rs. _____
3. Communications & Postage Rs. _____
4. Per Diem
   - Medical College Survey Team Rs. _____
   - Medical Officers of Health Centres Rs. _____
   - Community Informants Rs. _____
5. Miscellaneous Rs. _____

Total Rs. _____

Advance Received: Rs. _____

Total Expenditure: Rs. _____

Balance due/refunded: Rs. _____

P.S.: All vouchers/bills/receipts enclosed (Nos. _____).

Date _____ Principal Investigator

Prof. & HOD of Community Medicine Dean/Principal

**SV – 1** **1992**

## INCIDENCE OF RABIES AMONG ANIMALS DURING 1992 (JAN TO DEC) (ONE-YEAR PERIOD)

| | Clinical Grounds | | Laboratory Methods | | Commen |
|---|---|---|---|---|---|
| | No. of Cases Examined | No. of Cases Suspect | No. of Cases Suspect | No. Confirmed+ (Positive) | |
| 1. Canine | | | | | |
| 2. Feline | | | | | |
| 3. Bovine | | | | | |
| 4. Equine | | | | | |
| 5. Caprine | | | | | |
| 6. Wolf | | | | | |
| 7. Fox | | | | | |
| 8. Porcine | | | | | |
| 9. Bear | | | | | |
| 10. | | | | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | | |

Source: Veterinary College, _____, _____

\+ Methods Used 1._____ 2._____ 3._____

Name:_____

Designation:_____

Date_____

SV – 11

CONSOLIDATED



## INCIDENCE OF RABIES AMONG ANIMALS DURING 1992 - 2001 (JAN TO DEC) TEN-YEAR PERIOD

| | Clinical Grounds | | Laboratory Methods | | Commen |
|---|---|---|---|---|---|
| | No. of Cases Examined | No. of Cases Suspect | No. of Cases Suspect | No. Confirmed+ (Positive) | |
| 1. Canine | | | | | |
| 2. Feline | | | | | |
| 3. Bovine | | | | | |
| 4. Equine | | | | | |
| 5. Caprine | | | | | |
| 6. Wolf | | | | | |
| 7. Fox | | | | | |
| 8. Porcine | | | | | |
| 9. Bear | | | | | |
| 10. | | | | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | | |

Source: Veterinary College, _____, _____

\+ Methods Used 1._____ 2._____ 3._____

Name:_____

Designation:_____

Date_____

**RF – V**

## WHO & APCRI:
## NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

### DATA COLLECTION FROM RABIES FREE AREA: _____

### CHECK LIST (VETERINARY)

**I. Information (Statistics) collected (Tick Mark with comments)**

1. Import of Animals (Procedures. Rules, etc.): Yes ( ) No ( ) _____
2. Quarantine of Animals (Procedures. Rules, etc.): Yes ( ) No ( ) _____
3. Licensing of Pets (Procedures. Rules, etc.): Yes ( ) No ( ) _____
4. Licensing of Animal breeders (Procedures, Rules, etc): Yes ( ) No ( ) _____
5. Control of Stray Animals (Procedures. Rules, etc.): Yes ( ) No ( ) _____
6. Rabies notification/reporting: Yes ( ) No ( ) _____
7. ARV (Procurement/Storage/Usage) [92-02 Statistics]: Yes ( ) No ( ) _____
8. Rabies Statistics [1992-2002 Statistics] (SV-II): Yes ( ) No ( ) _____
9. Veterinary Infrastructure (Diagnosis facilities) etc. Yes ( ) No ( ) _____
10. Others (Specify): _____ Yes ( ) No ( ) _____
11. _____ Yes ( ) No ( ) _____

**II. Sources (Write Nos.)**

1. AH Directorate _____ 2. HQ Hospital _____
3. Veterinary Centers _____ 4. Private Centers _____
5. Others (Specify) _____ 6. _____
7. _____

**III. Informants (Write Nos.)**

1. Airport HO _____ 2. Seaport HO _____ 3. HO _____
4. AHD _____ 5. VO _____ 6. VI _____
7. Private Vets _____ 8. Others (Specify): _____
9. _____ 10. _____ 11. _____

**IV. Methods (Write Nos.)**

1. Interviews _____ 2. Records _____
3. Others (Specify): _____ 4. _____ 5. _____
6. _____ 7. _____ 8. _____

**V. Enclosures (Specify & Nos.)**

1. _____ 2. _____ 3. _____
4. _____ 5. _____ 6. _____
7. _____ 8. _____ 9. _____
10. _____ 11. _____ 12. _____

**VI. Dates & Days (Nos.) of Survey:** _____

Place: _____
Date: _____

_____
Chief/Principal Investigator
(Name & Signature)

**RF – M**

## WHO & APCRI:
## NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003

### DATA COLLECTION FROM RABIES FREE AREA: _____

### CHECK LIST (MEDICAL)

#### I. Information (Statistics) collected (Tick Mark with comments)

1. Disease Notification/Reporting: Yes ( ) No ( ) _____
2. Animal Bite (1992-2002) Statistics: Yes ( ) No ( ) _____
3. ARV & ARS (Procurement/Storage/Usage) [1992-2002 Statistics]: Yes ( ) No ( ) _____
4. Human Rabies (1992-2002) Statistics (S-3): Yes ( ) No ( ) _____
5. Health Infrastructure & Services: Yes ( ) No ( ) _____
6. Others (Specify): _____ Yes ( ) No ( ) _____
7. _____ Yes ( ) No ( ) _____

#### II. Sources (Write Nos.)

1. DHS _____ 2. HQ Hospital _____ 3. District Hospital _____
4. UHC _____ 5. CHC _____ 6. PHC _____
7. SC _____ 8. Private Hospitals/Clinics _____
9. Others (Specify) _____ 10. _____
11. _____ 12. _____ 13. _____

#### III. Informants (Write Nos.)

1. HO _____ 2. DHS _____ 3. MOH _____
4. Specialists _____ 5. GDMO _____ 6. Health Staff _____
7. Formal Leaders _____ 8. Informal Leaders _____
9. Community Informants (Postal/School/etc.) _____
10. PMPs_____ 11. Others _____

#### IV. Methods (Write Nos.)

1. Interviews _____ 2. Records _____ 3. Others (Specify): _____
4. _____ 5. _____ 6. _____

#### V. Enclosures (Specify & Nos.)

1. _____ 2. _____ 3. _____
4. _____ 5. _____ 6. _____
7. _____ 8. _____ 9. _____
10. _____ 11. _____ 12. _____

#### VI. Dates & Days (Nos.) of Survey: _____

Place: _____
Date: _____

_____
Chief/Principal Investigator
(Name & Signature)

## ITEMIZED CHECK LIST

**RF – VM**

## VETERINARY

**1. Import of Animals**
- Natural Fauna
- Food Animals
- Policy/Procedures
- Breeders
- Zoos/Circus
- Religious
- Smuggling

**2. Quarantine**
- Procedures
- Facilities
- Seaport
- Airport

**3. Licensing**
- Animals
- Procedures
- Numbers
- Vaccines

**4. Animal Breeders**
- Market
- License
- Numbers
- Type of Animals

**5. Stray Control**
- Animals
- Public Menace
- Methods
- Agencies
- Vaccines
- Budget

**6. Rabies**
- Surveillance
- FAT/BT/Sellers
- Reporting/Records
- Programme Officers
- Last Case
- Rabies Free ?
  - Since When ?
  - How ?
  - Why ?

**7. Veterinary Infrastructure**
- Hospitals
- Dispensaries
- Doctors
- Pharmacies
- Field Staff
- Private Sector

**8. Disease Reporting/Notification**
- Animal Survey
- Animal Husbandry Commissioner, New Delhi.
- DDG (Animal Sciences), ICAR, New Delhi.

## MEDICAL

**1. Disease Notification**
- Methods
- Statistics (Last case) [+ 10 yrs]
- Rabies Free ?
  - Since When ?
  - How ?
  - Why ?
- Diagnosis
  - Clinical
  - Laboratory
  - Autopsy for neurological deaths

**2. Animal Bite Management**
- Case Load (Government/Private)
- Biting Animals
- Treatment: Vaccines/Sera
- Budget
- Records/Reports

**3. Health Infrastructure**
- Hospitals
- Health Units
- Dispensaries
- Laboratories
- Pharmacies
- Isolation Hospital/Ward
- Indigenous Systems of Medicine
- Local Remedies (Popular)

**RF – D**

**WHO & APCRI:**
**NATIONAL MULTI-CENTRIC RABIES SURVEY – 2003**

**DATA COLLECTION FROM RABIES FREE AREA: _____**
**SURVEY (DATA COLLECTION) INSTRUMENT**

**I. Day & Date: _____ II. Institution/Source (Name, Address): _____**

_____

Phone/Fax/E-mail: _____

**III. Informants (Name & Designation) [Stay Duration with Dates DD/MM/YY]**

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

**IV. Data/Information provided: Medical ( ) Veterinary ( ) Both ( )**

**V. Items of Information**

| Medical | Veterinary |
|---|---|
| 1. _____ | 1. _____ |
| 2. _____ | 2. _____ |
| 3. _____ | 3. _____ |
| 4. _____ | 4. _____ |
| 5. _____ | 5. _____ |

**VI. Information**

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

## VII. Records/Reports per used

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

## VIII. Records/Reports Enclosed (Xerox) (Please Specify)

1. _____ 2. _____

3. _____ 4. _____

5. _____ 6. _____

## IX. Comments (if any)

1. _____

2. _____

3. _____

4. _____

## X. Enclosures (Total Nos. & Pages) _____

Place: _____
Date: _____

_____
Chief/Principal Investigator
(Name & Signature)

(**P.S.**: Always use HB Pencil + Carry eraser, sharpener, Clipboard, Stapler & Pins).

# ANNEXURE – IV

## LIST OF VETERINARY COLLEGES AND OTHER INSTITUTIONS, WHICH PARTICIPATED IN THE SURVEY

- **Dr. S. Abdul Rahman, Secretary, Commonwealth Veterinary Association, Bangalore (Co-investigator).**

1. Veterinary College, Bangalore, Karnataka.
2. Veterinary College, Bidar, Karnataka.
3. Veterinary College, Trichur, Kerala.
4. Veterinary College, Madras, Chennai.
5. Veterinary College, Nammakal, Tamil Nadu.
6. Veterinary College, Hyderabad, Andhra Pradesh.
7. Veterinary College, Mumbai, Maharashtra.
8. Veterinary College, Nagpur, Maharashtra.
9. Veterinary College, Akola, Maharashtra.
10. Veterinary College, Anand, Gujarat.
11. Veterinary College, Hissar, Haryana.
12. Veterinary College, Ludhiana, Punjab.
13. Veterinary College, Palampur, Himachal Pradesh.
14. Veterinary College, Bhubaneswar, Orissa.
15. Veterinary College, Srinagar, Jammu and Kashmir.
16. Veterinary College, Guwahati, Assam.
17. Veterinary College, Sirwal, Maharashtra.
18. Veterinary College, Udagir, Maharashtra

**OTHER INSTITUTIONS**

19. Indian Veterinary Research Institute, Izzatnagar, Uttar Pradesh.
20. Central Research Institute, Kasauli, Himachal Pradesh.
21. National Institute of Communicable Diseases, New Delhi.
22. Pasteur Institute of India, Coonoor, Tamil Nadu.
23. National Institute of Mental Health and Neurosciences, Bangalore.

# ANNEXURE – V

## WHO-APCRI NATIONAL MULTI-CENTRIC RABIES SURVEY – YEARWISE HUMAN RABIES DEATHS IN URBAN AREAS

| Sl. No | State | College | Name | Age | Sex | Date of Death | Year | Ward | | Zone | | UHC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Name | Pop. | Name | Pop. | Name | Pop |
| 1 | West Bengal | Kolkatta | BV | 12 | Male | 05.08.00 | 2000 | No.1, Titagarh Mun. | NA | | NA | BN Bose SD Hospital | 1,24,19 |
| 2 | West Bengal | Kolkatta | SSK | 30 | Female | 02.11.00 | 2000 | No.1, Titagarh Mun. | NA | | NA | BN Bose SD Hospital | A |
| 3 | Tamil Nadu | Chidambaram | NK | 38 | Female | 18.04.00 | 2000 | 4, Chidambaram | 1,976 | South Zone | | Chidambaram | 65, |
| 4 | Delhi | Delhi | DC | 58 | Male | 07.09.00 | 2000 | Shriram Nagar | 40,000 | East | 14,00,000 | Delhi Admn.Dispensary | 40, |
| 5 | Karnataka | Bangalore | BMP | 32 | Male | 17.06.00 | 2000 | T.Dasarahalli | 45,000 | | | Neela Maheshwari | 48 |
| 6 | Karnataka | Bangalore | SD | 4.5 | Male | 10.12.00 | 2000 | T.Dasarahalli | 45,000 | | | Neela Maheshwari | A |
| 7 | U.P. | Varanasi | CL | 35 | Male | 5.00 | 2000 | Bhelupur | 1,19,500 | Bhelupur | 1,90,900 | Vivekanand Hospital | N |
| 8 | Punjab | Amrithsar | NI | 6 | Female | 16.06.01 | 2001 | W-12 | 12,000 | Amritsar North | 60000 | ARC, Amritsar | 12, |
| 9 | Delhi | Delhi | GP | 53 | Male | 06.05.01 | 2001 | Balbir Nagar | 70,000 | East | 14,00,000 | Balbir Nagar | 70, |
| 10 | West Bengal | Kolkatta | SS | 8 | Female | 18.12.01 | 2001 | No.1, Titagarh Mun. | N.A. | | N.A. | BN Bose SD Hospital | A |
| 11 | West Bengal | Kolkatta | BS | 7 | Male | 03.09.01 | 2001 | No.1, Titagarh Mun. | N.A. | | N.A. | BN Bose SD Hospital | A |
| 12 | Gujarat | Jamnagar | DCS | 60 | Male | 24.08.01 | 2001 | No.8, P. towar area | 16,613 | | N.A. | City Dispensary | N |
| 13 | Bihar | Dharbanga | SD | 40 | Female | 10.08.01 | 2001 | No.21, Mistratols | N.A. | | N.A. | DMC, Darbhanga | 43, |
| 14 | UP | Agra | CN | 12 | Male | 19.10.01 | 2001 | Lohamandi | N.A. | | N.A. | Lohamandi | 8, |
| 15 | UP | Varanasi | MR | 21 | Male | 05.10.01 | 2001 | Chetganj | 1,40,196 | Dashaswamedh | 2,58,000 | Marwari Private Hospital | N |
| 16 | Maharashtra | Nagpur | CRD | 5 | Male | 17.01.01 | 2001 | 72/36/Kapse Chauk | 12,000 | Lakadganj | 2,48,374 | NMC, Dalvai Hospital | 12 |
| 17 | Maharashtra | Nagpur | MJ | 25 | Male | 01.10.01 | 2001 | 42, B.K. Gupta nagar | 13,500 | Sataranjipura | 1,99,318 | NMC, Shantinagar | 13, |
| 18 | UP | Varanasi | MS | 38 | Male | 31.01.01 | 2001 | Shivpur | 42,000 | Barunapar | 2,01,240 | Upgraded Govt. Hospital | N |
| 19 | Rajasthan | Jaipur | SJ | 16 | Female | 31.01.02 | 2002 | 12 | 1,393 | | N.A. | Bagru | 39, |
| 20 | J&K | Jammu | KC | 70 | Male | 12.09.02 | 2002 | A | 2,000 | Gorkhanagar | 11,000 | Bahu Fort | 100 |
| 21 | West Bengal | Kolkatta | AR | 7 | Female | 05.11.02 | 2002 | No.1, Titagarh Mun. | N.A. | | N.A. | BN Bose SD Hospital | As |
| 22 | West Bengal | Kolkatta | BP | 38 | Female | 20.10.02 | 2002 | No.1, Titagarh Mun. | N.A. | | N.A. | BN Bose SD Hospital | As |
| 23 | A.P. | Hyderabad | MK | 42 | Male | 01.01.02 | 2002 | Ganganagar | 1,61,438 | MCH-Circle-V | 3,04,981 | Borabanda | 52, |
| 24 | M.P. | Bhopal | PN | 50 | Male | 28.06.02 | 2002 | 38 | 17,152 | Jone No.7 | 1,10,274 | Civil Dispensary | 126 |
| 25 | Delhi | Delhi | VR | 35 | Male | 01.04.02 | 2002 | Ramnagar | 40,000 | East | 14,00,000 | Delhi Admn.Disp. | As |
| 26 | Bihar | Dharbanga | MIA | 48 | Male | 31.08.02 | 2002 | No.34, Bents Sangari | N.A. | | N.A. | DMC, Darbhanja | As |
| 27 | A.P. | Hyderabad | SR | 54 | Male | 15.02.02 | 2002 | Vijay Nagar Colony | 91,105 | MCH-Circle-IV | 4,69,878 | Indira Nagar | 72, |
| 28 | M.P. | Bhopal | TB | 40 | Female | 19.12.02 | 2002 | 23 | 15,616 | Jone No.5 | 1,05,078 | Indra Gandhi Hospital | N |
| 29 | M.P. | Bhopal | KB | 50 | Male | 24.04.02 | 2002 | 55 | 15,394 | Jone No.10 | 1,16,952 | J.D.Hospital | N |
| 30 | Rajasthan | Jaipur | GS | 55 | Male | 26.08.02 | 2002 | | 34,468 | | N.A. | Jhotwada | 150 |

| Sl. No | State | College | Name | Age | Sex | Date of Death | Year | Ward | | Zone | | UHC | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Name | Pop. | Name | Pop. | Name | Pop |
| 31 | Gujarat | Jamnagar | SNP | 60 | Male | 12.12.02 | 2002 | No.6, Kadiyawad area | 16,118 | NA | N.A. | NA | N |
| 32 | Karnataka | Bangalore | TD | 32 | Male | 15.06.02 | 2002 | T.Dasarahalli | 45,000 | | N.A. | Neela Maheshwari | A |
| 33 | Maharashtra | Nagpur | VBK | 8 | Male | 21.04.02 | 2002 | 67, Satranji pura | 12,000 | Sataranjipura | 1,99,318 | NMC, Binaki Hospital | 12, |
| 34 | Maharashtra | Nagpur | SB | 60 | Female | 30.11.02 | 2002 | Hiwari Nagar | 11,500 | Lakadganj | 2,48,374 | NMC, Dalvi Hospital | 12, |
| 35 | Kerala | Trissur | CY | 38 | Male | 26.11.02 | 2002 | | N.A. | Lakkadi | 45,322 | Ottapalam | 51, |
| 36 | Rajasthan | Jaipur | SD | 12 | Male | 06.06.02 | 2002 | 15 | 1,134 | | N.A. | Phulera | 24 |
| 37 | Delhi | Delhi | RLP | 35 | Male | 18.08.02 | 2002 | Baljit Nagar | 40,000 | North West | 23,00,000 | RML Hospital | 4000 |
| 38 | Punjab | Amrithsar | VK | 16 | Male | 18.02.02 | 2002 | W-53 | 22,000 | Amritsar North | 110,000 | Tungbala | 22, |
| 39 | Kerala | Kannur | KU | 51 | Male | 28.03.02 | 2002 | 12 | N.A. | | N.A. | UHC | 51, |
| 40 | Assam | Gauhati | KC | 45 | Female | 3.02 | 2002 | No.08 | 4,669 | | N.A. | UHC, Ullubari | 85 |
| 41 | Goa | Goa | RG | 45 | Male | 7.6.02 | 2002 | Maushiwad | 1800 | Valpoi | 7913 | Valpoi | 49 |
| 42 | Orissa | Berhampur | SM | 12 | Male | 14.08.02 | 2002 | No.2, 3, 4, 8 | 10,713 | Aska Road | 44,856 | Zonal Disp., Aska Road | 44 |
| 43 | Orissa | Berhampur | TB | 11 | Male | 05.05.02 | 2002 | No.2, 3, 4, 8 | 10,713 | Aska Road | 44,856 | Zonal Disp., Aska Road | As |
| 44 | AP | Hyderabad | SA | 22 | Male | 01.04.03 | 2003 | Bhavani Nagar | 2,48,286 | MCH-Circle-I | 7,31,674 | Aman Nagar | 59, |
| 45 | Tamil Nadu | Chidambaram | KK | 60 | Female | 06.02.03 | 2003 | 10, Chidambaram | 2,264 | South Zone | | Chidambaram | 65, |
| 46 | Orissa | Cuttack | BG | 55 | Female | 10.02.03 | 2003 | Choudwar | 42,597 | | N.A. | | N |
| 47 | Orissa | Cuttack | SKS | 16 | Male | 18.01.03 | 2003 | No.2, Choudwar | 42,597 | | N.A. | | As |
| 48 | Orissa | Cuttack | SKS | 45 | Male | 29.03.03 | 2003 | No.2, Choudwar | 42,597 | | N.A. | | As |
| 49 | Punjab | Amrithsar | BDS | 65 | Male | 19.03.03 | 2003 | W-22 | 20,000 | Amritsar Centre | 1,00,000 | Chowk Fuhara | 20, |
| 50 | Maharashtra | Nagpur | SCPK | 60 | Female | 05.02.03 | 2003 | 38, Siraspeth | 9,911 | Hanumannagar | 2,31,665 | Mahal Diognostic centre | 9, |
| 51 | Goa | Goa | GR | 45 | Female | 18.03.03 | 2003 | Porvarim | 4,000 | Penna-De-France | 15375 | Mapusa | 40 |
| 52 | Assam | Gauhati | SI | 11 | Male | 09.03.03 | 2003 | No.50 | 2,763 | | N.A. | UHC, Ullubari | 85, |
| 53 | Bihar | Dharbanga | RA | 2.5 | Male | 24.04.03 | 2003 | No.28, Alalpatti | | | | Urban H.C.,DMC | 43, |
| 54 | Bihar | Dharbanga | CY | 52 | Male | 07.04.03 | 2003 | No.33, Bakergaj | | | | Urban H.C.,DMC | As |
| | | | | | | | | Total | | | | | |

**Cases not considered for estimation of total case load due to ambigious population base**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 55 | Delhi | Delhi | DI | 25 | Male | 30.12.02 | 2002 | Rohini | 700,000 | Inf. Diseases Hosp. | 700000 |
| 56 | Delhi | Delhi | KR | 23 | Male | 24.07.02 | 2002 | R.K.Puram | 400000 | Mat. Hosp. RKPuran | 400000 |

| Summary of cases | |
|---|---|
| **Year** | **Cases** |
| 2000 | 7 |
| 2001 | 11 |
| 2002 | 27 |
| 2003 | 11 |
| **Total** | **56** |

Note:

1 N.A.: Not available/Not provided

2 Due to poor area demarkation / Population information in Urban India, the smallest Unit, Viz., Ward / Zone / UHC is taken for base population

# WHO-APCRI NATIONAL MULTI-CENTRIC RABIES SURVEY 2003: YEARWISE HUMAN RABIES DEATHS IN RURAL AREAS

| Sl. No. | State | College | Name | Age | Sex | Date of Death | Year of Death | Village Name | PHC Name |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Delhi | Delhi | Rohit | 9.5 | Male | 12.03.03 | 2003 | Mandoli | A2 Dispensary |
| 2 | Gujrat | Jamnagar | Bal Kishan | 11 | Male | 22.03.01 | 2001 | Hapa | Aliabada |
| 3 | Delhi | Delhi | Rukhsar | 8 | Female | 22.02.00 | 2000 | Anand Nagar | Anand Nagar Ghonda |
| 4 | Rajasthan | Jaipur | Ganga Devi Sharma | 60 | Female | 08.11.02 | 2002 | Andhi | Andhi |
| 5 | UP | Varanasi | Rampattu | 47 | Male | 5.01 | 2001 | Muyali | Barai |
| 6 | UP | Varanasi | Salaru | 45 | Male | 6.01 | 2001 | Muyali | Barai |
| 7 | Gujrat | Jamnagar | Jagruti R. Sharma | 5 | Female | 04.06.99 | 1999 | Navagam Ghed | Bedi |
| 8 | Gujral | Jamnagar | Jadeja Jatubha A. Singh | 28 | Male | 26.10.00 | 2000 | Naragam Ghed | Bedi |
| 9 | Gujrat | Jamnagar | Kulsambar Zuned Namer | 40 | Female | 12.04.00 | 2000 | Bedi | Bedi |
| 10 | Karnataka | Bangalore | Manjunatha D. | 15 | Male | 05.07.02 | 2002 | Doddatogoor | Begur |
| 11 | MP | Bhopal | Surendra Kumar | 18 | Male | 24.08.00 | 2000 | Berasia | Berasia |
| 12 | M.P. | Bhopal | Babloo | 11 | Male | 11.01.03 | 2003 | Megrakala | Berasia |
| 13 | UP | Agra | Eswar Prasad | 55 | Male | 12.98 | 1998 | Dehtora | Bichpuri |
| 14 | UP | Agra | Kishan Devi | 65 | Female | 21.10.99 | 1999 | Kalware | Bichpuri |
| 15 | UP | Agra | Pappu | 14 | Male | 7.99 | 1999 | Kalware | Bichpuri |
| 16 | UP | Agra | Sapna | 11 | Female | 6.99 | 1999 | Kalware | Bichpuri |
| 17 | UP | Agra | Angoori Devi | 45 | Female | 12.11.00 | 2000 | Patholi | Bichpuri |
| 18 | UP | Agra | Devendra | 20 | Male | 07.03.01 | 2001 | Sonari | Bichpuri |
| 19 | UP | Agra | Hussain | 7 | Male | 7.01 | 2001 | Artone | Bichpuri |
| 20 | UP | Agra | Bholeram | 12 | Male | 02.03.02 | 2002 | Patholi | Bichpuri |
| 21 | UP | Agra | Chandani | 11 | Female | 6.02 | 2002 | Negla Howali | Bichpuri |
| 22 | UP | Agra | Tehu | 4 | Male | 17.03.03 | 2003 | Mohammadpur | Bichpuri |
| 23 | Assam | Gauhati | Lester Marak | 32 | Male | 9.98 | 1998 | Kinan Gaon Bangaon Mouza | Boko |
| 24 | Assam | Gauhati | Clemsing Sangma | 35 | Male | 4.99 | 1999 | Kinan Gaon Bangaon Mouza | Boko |
| 25 | Assam | Gauhati | Nur Jamal | 7 | Male | 13.05.02 | 2002 | Jambari | Boko |
| 26 | Delhi | Delhi | Ramkali | 50 | Female | 30.12.02 | 2002 | New Seelampur | CGHS Dispensary |
| 27 | Assam | Gauhati | Parikshit Das | 18 | Male | 17.06.01 | 2001 | Makali | Chaygaom |
| 28 | Kerala | Kannur | Shylaja T | 40 | Female | 23.03.02 | 2002 | Chengalayi | Chengalayi |
| 29 | UP | Varanasi | Anil | 15 | Male | 8.00 | 2000 | Salarpur | Chiraigaon |
| 30 | UP | Varanasi | Vinod | 9 | Male | 4.02 | 2002 | Salarpur | Chiraigaon |
| 31 | UP | Varanasi | Kalpana | 7 | Female | 18.04.03 | 2003 | Rustampur | Chiraigaon |
| 32 | UP | Varanasi | Bhagmani Devi | 75 | Female | 27.03.03 | 2003 | Salarpur | Chiraigaon |
| 33 | West Bengal | Kolkatta | Minati Chatterjee | 60 | Female | 03.07.99 | 1999 | Chouberia | Chouberia |
| 34 | West Bengal | Kolkatta | Santi Gayth | 43 | Male | 26.09.02 | 2002 | Saola Para Hingli | Chouberia |
| 35 | West Bengal | Kolkatta | Rahamat Ali Mandel | 9 | Male | 07.08.02 | 2002 | Metapara | Chouberia |

| Sl. No. | State | College | Name | Age | Sex | Date of Death | Year of Death | Village Name | PHC Name |
|---|---|---|---|---|---|---|---|---|---|
| 36 | Goa | Goa | Gopal Mandavkar | 60 | Male | 14.02.99 | 1999 | Old Goa | Corlim |
| 37 | Goa | Goa | Rajaram Vaygankar | 45 | Male | 02.08.02 | 2002 | Divar | Corlim |
| 38 | Goa | Goa | Michael Perreira | 77 | Male | 22.02.03 | 2003 | Divar | Corlim |
| 39 | Goa | Goa | Zavier Kero | 29 | Male | 27.09.01 | 2001 | Chandor | Curtorim |
| 40 | Goa | Goa | Cistudo Almeida | 24 | Male | 30.03.03 | 2003 | Macasana | Curtorim |
| 41 | Delhi | Delhi | Sunita | 8 | Female | 03.08.00 | 2000 | Nand Nagri | Delhi Admn's Dispensary |
| 42 | Delhi | Delhi | Manju | 9 | Female | 15.07.00 | 2000 | Shiv Vihar | Delhi Admn's Dispensary |
| 43 | Delhi | Delhi | Ashwani | 9 | Male | 19.04.01 | 2001 | Kuldenpur | Delhi Admn's Dispensary |
| 44 | Delhi | Delhi | Jai Prakash | 22 | Male | 17.04.02 | 2002 | Kalyanpuri VII Ghorala | Delhi Admn's Dispensary |
| 45 | Delhi | Delhi | Vicky | 6 | Male | 06.02.03 | 2003 | Uttamnagar | Delhi Admn's Dispensary |
| 46 | Delhi | Delhi | Ravinkant | 10 | Male | 30.03.03 | 2003 | Mandoli Extension | Delhi Admn's Dispensary |
| 47 | A.P. | Hyderabad | G.Gopal Reddy | 70 | Male | 02.02.03 | 2003 | Naganpalli | Dhandumylaram |
| 48 | Gujrat | Jamnagar | Ashok Gordhan | 12 | Male | 02.08.02 | 2002 | Khimaliya | Dhutarpar |
| 49 | Delhi | Delhi | Chaliter Patel | 45 | Male | 12.10.02 | 2002 | Nand Nagri | E4 Dispensary |
| 50 | UP | Agra | Buddho | 55 | Female | 7.98 | 1998 | Dithvara | Fatehpur Sikri |
| 51 | UP | Agra | Teblu | 13 | Male | 5.99 | 1999 | Dithvara | Fatehpur Sikri |
| 52 | UP | Agra | Jitendra | 12 | Male | 9.00 | 2000 | Dabur | Fatehpur Sikri |
| 53 | UP | Agra | Rani | 5 | Female | 5.00 | 2000 | Dithvara | Fatehpur Sikri |
| 54 | UP | Agra | Puspa | 11 | Female | 9.00 | 2000 | Nazir Pura | Fatehpur Sikri |
| 55 | UP | Agra | Chotelal | 62 | Male | 9.00 | 2000 | Dithvara | Fatehpur Sikri |
| 56 | UP | Agra | Rajni | 5 | Female | 14.04.02 | 2002 | Kherajat | Fatehpur Sikri |
| 57 | UP | Agra | Anju | 10 | Female | 19.04.03 | 2003 | Nagla Saharpur | Fatehpur Sikri |
| 58 | UP | Varanasi | Dasu | 48 | Male | 03.01.00 | 2000 | Saraimohana | Gobraha |
| 59 | West Bengal | Kolkatta | Abhijith Debnath | 5 | Male | 06.03.00 | 2000 | Amkola | Gaighata |
| 60 | West Bengal | Kolkatta | Dupankar Poddar | 3.5 | Male | 24.05.01 | 2001 | Narikala | Gaighata |
| 61 | West Bengal | Kolkatta | Nilkanta Patra | 60 | Male | 19.11.01 | 2001 | Bakchara | Gaighata |
| 62 | Bihar | Darbhanga | Sudhir Kr. Roy | 14 | Male | 18.07.02 | 2002 | Gayaghat | Gayaghat |
| 63 | Bihar | Dharbhanga | Pramod Kumar | 25 | Male | 24.04.03 | 2003 | Gayaghat | Gayaghat |
| 64 | Maharashtra | Nagpur | Darumbai Mahadea Fulzele | 105 | Female | 20.01.00 | 2000 | Khasala | Gumthi |
| 65 | West Bengal | Kolkatta | Krishna Dhara | 12 | Male | 01.08.01 | 2001 | Tongtala | Hariharpur |
| 66 | West Bengal | Kolkatta | Kuddus Purkait | 45 | Male | 17.08.02 | 2002 | Chakerberia | Hariharpur |
| 67 | West Bengal | Kolkatta | Asok Naskar | 40 | Male | 13.10.02 | 2002 | Biral | Hariharpur |
| 68 | West Bengal | Kolkatta | Daud Kazi | 65 | Male | 22.12.02 | 2002 | Bamberia Sikarbali | Indra Pala |
| 69 | Rajasthan | Jaipur | Satyawan | 45 | Male | 18.05.02 | 2002 | Mundota | Kalwad |
| 70 | Rajasthan | Jaipur | Maliram | 6 | Male | 17.05.02 | 2002 | Mundota | Kalwad |
| 71 | Rajasthan | Jaipur | Bheema | 11 | Male | 25.02.02 | 2002 | Mundota | Kalwad |
| 72 | Bihar | Darbhanga | Vinod Kr. Sah | 13 | Male | 10.09.01 | 2001 | Porushottampur | Kalyanpur |
| 73 | Bihar | Dharbhanga | Santosh Kumar | 17 | Male | 13.08.01 | 2001 | Anjara | Kalyanpur |
| 74 | Bihar | Darbhanga | Babaja Sahani | 25 | Male | 30.07.02 | 2002 | Mirzapur | Kalyanpur |

| Sl. No. | State | College | Name | Age | Sex | Date of Death | Year of Death | Village Name | PHC Name |
|---|---|---|---|---|---|---|---|---|---|
| 75 | Bihar | Dharbhanga | Rajendra Paswan | 55 | Male | 26.04.03 | 2003 | Malipur | Kalyanpur |
| 76 | Bihar | Dharbhanga | Mukesh | 12 | Male | 24.04.03 | 2003 | Kalyanpur | Kalyanpur |
| 77 | Tamilnad | Chidambaram | T.Ramalingam | 56 | Male | 12.03.00 | 2000 | U.Agaram | Kammapuram |
| 78 | Tamilnadu | Chidambaram | Sekar K. | 43 | Male | 27.09.02 | 2002 | Kammapuram | Kammapuram |
| 79 | Orissa | Cuttack | Phuni Dei | 45 | Female | 15.02.03 | 2003 | Fakirpada | Kandarpar |
| 80 | Orissa | Cuttack | Bhani Nayak | 60 | Female | 27.03.03 | 2003 | Fakirpada | Kandarpar |
| 81 | AP | Hyderabad | Srikanth | 5 | Male | 11.11.02 | 2002 | Ameerpet | Kandhukur |
| 82 | Maharastra | Nagpur | Ranjana Hansray Ingole | 10 | Female | 11.00 | 2000 | Pipri | Kanhan |
| 83 | Maharastra | Nagpur | Biru Bhupesh Thakar | 6 | Male | 7.01 | 2001 | Kandri | Kanhan |
| 84 | Maharastra | Nagpur | Kavita Shyamrao Rokde | 28 | Female | 20.06.01 | 2001 | Kanhan | Kanhan |
| 85 | Maharastra | Nagpur | Ramdas Meshram | 40 | Male | 08.08.02 | 2002 | Kandri | Kanhan |
| 86 | Delhi | Delhi | Ved Prakash | 18 | Male | 23.11.02 | 2002 | Nehru Vikas | Karawal Nagar Dispensary |
| 87 | Maharastra | Nagpur | Devchand Jairam Sontakhe | 22 | Male | 12.10.00 | 2000 | Pipraya | karwahi |
| 88 | Maharastra | Nagpur | Radhesham Laxman | 12 | Male | 14.06.02 | 2002 | Deolapar | karwahi |
| 89 | Orissa | Cuttak | Pravat Kumar Das | 42 | Male | 4.05.98 | 1998 | Bhagapur | Kaudapada |
| 90 | Orissa | Cuttack | Biswajit Mohanty | 16 | Male | 23.01.01 | 2001 | Nimapur | Kaudapada |
| 91 | Orissa | Cuttack | Domy Swain | 75 | Female | 27.11.02 | 2002 | Nimapur | Kaudapada |
| 92 | Orissa | Cuttack | Bhabani Mohanty | 65 | Female | 03.12.02 | 2002 | Nimapur | Kaudapada |
| 93 | Assam | Gauhati | Seenom Tumung | 7 | Female | 06.04.00 | 2000 | Dhopguri | Khatri |
| 94 | Assam | Gauhati | Lukumoni Boro | 10 | Female | 6.99 | 1999 | Drulguri | Khetri |
| 95 | Kerala | Trissur | Gopalakrishnan | 65 | Male | 24.11.00 | 2000 | Kodambu | Kodambu |
| 96 | Kerala | Trissur | Krishnakutty | 51 | Male | 19.05.02 | 2002 | Kongad | Kongad |
| 97 | AP | Hyderabad | E.Ramesh | 30 | Male | 24.02.02 | 2002 | Narasappa guda | Kothur |
| 98 | Kerala | Trissur | Vimitha | 9 | Female | 21.01.02 | 2002 | Kottayi | Kottayi |
| 99 | Kerala | Trissur | Raman | 37 | Male | 06.02.03 | 2003 | Kottayi | Kottayi |
| 100 | Kerala | Kannur | Raveendran | 46 | Male | 25.11.02 | 2002 | __ | Kurishummukku |
| 101 | Gujrat | Jamnagar | Anilbhai Kalyanyibhur | 35 | Male | 26.12.00 | 2000 | Naghedi | Lakhabarad |
| 102 | Gujrat | Jamnagar | Valuben Valsur | 11 | Female | 09.03.03 | 2003 | Raval Sar | Lakhabarad |
| 103 | Delhi | Delhi | Yogita | 6 | Female | 25.03.03 | 2003 | Indra camp, Kalyanpur | Lal Bahadur Dispensary |
| 104 | Goa | Goa | Maria Gudinho | 68 | Female | 30.10.98 | 1998 | Velsao | Loutulim |
| 105 | Goa | Goa | Delphin Pereira | 23 | Female | 19.11.99 | 1999 | Nuverm | Loutulim |
| 106 | Goa | Goa | Magdalina Perreira | 52 | Female | 08.05.00 | 2000 | Carambolim | Mandur |
| 107 | Goa | Goa | Maria A. Vales | 60 | Female | 23.03.01 | 2001 | Mercurim | Mandur |
| 108 | Maharastra | Nagpur | Sukhchand Neware | 34 | Male | 23.10.99 | 1999 | Mauda | Mauda |
| 109 | Maharastra | Nagpur | Aniket Krishna Raut | 4 | Male | 08.12.01 | 2001 | Chehadi | Mauda |
| 110 | Maharastra | Nagpur | Raghunath Khewale | 45 | Male | 22.03.02 | 2002 | Pawad Dauna | Mauda |
| 111 | Maharastra | Nagpur | Shobha Hari Ukey | 40 | Female | 3.02 | 2002 | Bhanewada | Mauda |
| 112 | H.P | Shimla | Manmohan | 10 | Male | 15.04.03 | 2003 | Lagal | Mazhaar |
| 113 | Assam | Gauhati | Dhiman Das | 40 | Male | 3.00 | 2000 | Mirza | Mirza |

| Sl. No. | State | College | Name | Age | Sex | Date of Death | Year of Death | Village Name | PHC Name |
|---|---|---|---|---|---|---|---|---|---|
| 114 | MP | Bhopal | Mahendra Patidar | 21 | Male | 29.11.00 | 2000 | Babadiya Kalan Misrod | Misrod |
| 115 | Rajasthan | Jaipur | Ram Karan Gurjar | 80 | Male | 18.04.02 | 2002 | Kheri Suha | Mojmabad |
| 116 | Orissa | Behrampur | Kamala Gouda | 50 | Female | 18.07.00 | 2000 | B.Madhabpur | Muncipentha |
| 117 | Orissa | Behrampur | M.Khandeswar Reddy | 37 | Male | 27.06.02 | 2002 | Kamatalli | Muncipentha |
| 118 | Orissa | Bhermpur | Chandan Nayak | 4 | Male | 2.02 | 2002 | Patalampur | Muncipentha |
| 119 | Orissa | Bhermpur | Ganteyee Sahu | 42 | Male | 10.02 | 2002 | Gangapur | Muncipentha |
| 120 | Orissa | Bhermpur | Doli Behera | 35 | Male | 22.01.03 | 2003 | B.Madhabpur | Muncipentha |
| 121 | Kerala | Trissur | Appukuttan | 48 | Male | 09.03.02 | 2002 | Mundur II, Ward 13 | Mundur |
| 122 | Kerala | Trissur | Mayala | 37 | Female | 16.02.03 | 2003 | Muthalamada | Muthalamada |
| 123 | Orissa | Behrampur | Ang Gumaya | 10 | Male | 01.02.01 | 2001 | Sana Nolia Nuagaon | N.Nuagaon |
| 124 | Orissa | Bhermpur | W.Lacchaya | 38 | Male | 12.12.02 | 2002 | Raiketru | N.Nuagaon |
| 125 | Orissa | Bhermpur | S.Govinda | 14 | Male | 15.08.02 | 2002 | T.Berhampur | N.Nuagaon |
| 126 | Karnataka | Bangalore | Channappa | 48 | Male | 21.11.02 | 2002 | Kadabur | Namgondlu |
| 127 | AP | Hyderabad | Gopi | 8 | Male | 01.02.02 | 2002 | J.P.Darga, Lambadithanda | Nandigama |
| 128 | Delhi | Delhi | Hasim | 80 | Male | 18.09.02 | 2002 | Nangloi | Nangloi Dispensary |
| 129 | Orissa | Behrampur | Namita Pradhan | 16 | Female | 3.98 | 1998 | Tota Sahi, Balrampur | Narendrapur |
| 130 | Orissa | Berhampur | Gurubaria Das | 55 | Male | 16.01.03 | 2003 | Tanganapalli | Narendrapur |
| 131 | Orissa | Bhermpur | L.Kankamma Reddy | 75 | Female | 19.03.03 | 2003 | Tata Colony | Narendrapur |
| 132 | Orissa | Berhampur | Hari Pradhan | 55 | Male | 18.01.03 | 2003 | Balarampur | Narendrapur |
| 133 | A.P. | Hyderabad | G.Lachaiah | 50 | Male | 09.02.03 | 2003 | Palmakolu | Narsinghi |
| 134 | Rajasthan | Jaipur | Dharam Raj | 4 | Male | 11.04.02 | 2002 | Paledu | Nayala |
| 135 | Delhi | Delhi | Rajpal | 40 | Male | 15.04.00 | 2000 | New Jagatpur | New Jagatpur |
| 136 | MP | Bhopal | Mahendra Singh | 5 | Male | 19.04.00 | 2000 | Tamod | Obdullagani |
| 137 | Tamilnad | Chidambaram | Mani | 45 | Male | 16.10.00 | 2000 | Boothangudi | Orathur |
| 138 | Tamilnad | Chidambaram | Kaliyan | 55 | Male | 26.07.00 | 2000 | Boothangudi | Orathur |
| 139 | Tamilnad | Chidambaram | Saroja | 55 | Female | 30.04.00 | 2000 | Boothangudi | Orathur |
| 140 | Tamilnad | Chidambaram | V. Meenatchi | 8 | Female | 26.01.01 | 2001 | Sathyamangalam | Orathur |
| 141 | Kerala | Kannur | Narayanan K.V. | 55 | Male | 17.03.02 | 2002 | Keranpeedika | Pariyaram |
| 142 | MP | Bhopal | Manohar | 12 | Male | 03.06.99 | 1999 | Phanda Kalan | Phanda PHC |
| 143 | Kerala | Trissur | K.Velayudan | 53 | Male | 09.07.02 | 2002 | Pirayari ward 9/261 | Pirayari |
| 144 | Delhi | Delhi | Rakhi | 10 | Female | 08.07.02 | 2002 | Prahladpur | Prahladpur Dispensary |
| 145 | Assam | Gauhati | Khalil Ali | 45 | Male | 28.04.01 | 2001 | Rampur | Rampur |
| 146 | J & K | Jammu | Kundanlal | 26 | Male | 12.06.00 | 2000 | Jassore | RS Pura |
| 147 | J & K | Jammu | Rajkumar | 6.5 | Male | 16.03.00 | 2000 | Kothi Budhe | RS Pura |
| 148 | UP | Agra | Salkiram | 25 | Male | 15.05.01 | 2001 | Verrai | Saiyan |
| 149 | UP | Agra | Rajjoo | 50 | Male | 4.01 | 2001 | Verrai | Saiyan |
| 150 | Orissa | Cuttack | Biswaranjit Rath | 12 | Male | 26.08.02 | 2002 | Phulahara | Salajanga |
| 151 | Orissa | Cuttack | Lunarani Sahu | 9 | Female | 16.08.02 | 2002 | Salagaon | Salajanga |
| 152 | UP | Varanasi | Santosh | 17 | Male | 25.07.99 | 1999 | Hridaypur | Sarnath |

| Sl. No. | State | College | Name | Age | Sex | Date of Death | Year of Death | Village Name | PHC Name |
|---|---|---|---|---|---|---|---|---|---|
| 153 | UP | Varanasi | Lalchand | 49 | Male | 28.07.00 | 2000 | Hridaypur | Sarnath |
| 154 | J & K | Jammu | Gaurav | 5.5 | Male | 02.12.02 | 2002 | Sohanjana | SDH Sonanjana |
| 155 | J & K | Jammu | Aneeta | 16 | Female | 15.01.03 | 2003 | Allora | SDH Sonanjana |
| 156 | Goa | Goa | Suryakant Haldankar | 55 | Male | 17.05.01 | 2001 | Anjuna | Siolim |
| 157 | Rajasthan | Jaipur | Vikram | 11 | Male | 23.08.02 | 2002 | Niwaru | Sirsi |
| 158 | Bihar | Darbhanga | Sita Devi | 38 | Female | 10.12.00 | 2000 | Sonki | Sonki |
| 159 | Bihar | Darbhanga | Vakil Paswan | 13 | Male | 03.12.02 | 2002 | Dekli Chatti | Sonki |
| 160 | Bihar | Dharbhanga | Nazma Khatum | 5 | Female | 15.12.02 | 2002 | Sonki | Sonki |
| 161 | Bihar | Darbhanga | Sagarlal Deo | 35 | Male | 05.04.03 | 2003 | Jafsa | Sonki |
| 162 | Bihar | Dharbhanga | Bansari Sao | 48 | Male | 10.01.03 | 2003 | Sonki | Sonki |
| 163 | H.P. | Shimla | Lumcha Ram | 60 | Male | 18.11.99 | 1999 | Shakrori | Sunni |
| 164 | H.P | Shimla | Geeta Ram | 26 | Male | 17.01.01 | 2001 | Reog | Sunni |
| 165 | Delhi | Delhi | Jai Narayan | 50 | Male | 23.04.02 | 2002 | Trilok Puri | Trilok Puri Dispensary |
| 166 | Assam | Gauhati | Jasminara Begam | 8 | Female | 12.01 | 2001 | Uparhali | Uparhali |
| 167 | Punjab | Amritsar | Swaran Kaur | 55 | Female | 10.98 | 1998 | Fatehgarh Shirker Chak | Verka |
| 168 | Punjab | Amritsar | Dhir Singh | 40 | Male | 03.12.98 | 1998 | Hayer | Verka |
| 169 | Punjab | Amritsar | Ramandeep Singh | 8 | Male | 22.12.98 | 1998 | Mira Kot Khurd | Verka |
| 170 | Punjab | Amritsar | Sarbjeet Kaur | 8 | Female | 18.07.98 | 1998 | Ibban Kalan | Verka |
| 171 | Punjab | Amritsar | Satnam Singh | 12 | Male | 98 | 1998 | Wadala Bhitte Vali | Verka |
| 172 | Punjab | Amritsar | Rehmat Masin | 50 | Male | 12.99 | 1999 | Rodiwala | Verka |
| 173 | Punjab | Amritsar | Kuldip | 16 | Male | 99 | 1999 | Chak Muland | Verka |
| 174 | Punjab | Amritsar | Satnam Singh | 12 | Male | 7.00 | 2000 | Ibban Kalan | Verka |
| 175 | Punjab | Amritsar | Preeti | 4 | Female | 6.00 | 2000 | Wadala Bhitte Vali | Verka |
| 176 | Punjab | Amritsar | Narinder Kaur | 55 | Female | 7.01 | 2001 | Mira Kot Khurd | Verka |
| 177 | Karnataka | Bangalore | Narasamma | 50 | Female | 08.02.01 | 2001 | Idgur | Viduraswatha |
| 178 | Karnataka | Bangalore | Mallikarjuna | 35 | Male | 29.09.02 | 2002 | Kadirenahalli | Viduraswatha |
| | Total | | | | | | | | |
| One case not considered for estimation of total case load due to ambigious population base | | | | | | | | | |
| 179 | Delhi | Delhi | Satish | 25 | Male | 23.3.03 | 2003 | R.K.Puram | Safdarjung hospital |

| Summary of cases | |
|---|---|
| **Year** | **Cases** |
| 1998 | 11 |
| 1999 | 16 |
| 2000 | 36 |
| 2001 | 28 |
| 2002 | 58 |
| 2003 | 30 |
| **Total** | **179** |

Note :

1 Surveyed population refers to 2001 Census population

2 Total Surveyed population : 1298897 (Urban) (33%) + 3935290 (67%) = 5234187 population

# Annexure – VI

## Photo – 1

**Orientation meeting of Principal Investigators, APCRI Survey Team, with WHO Representatives at KIMS, Bangalore (24th February 2003)**

## Photo – 2

**Principal Investigator (Dr. N. R. Ramesh Masthi, Bangalore) and his team doing an household survey**

**Photo – 3**


**The Chief Investigator (Dr. M. K. Sudarshan, 4th from left with file in hand) along with Veterinarians at the main Veterinary Hospital, Port Blair, Andaman & Nicobar Islands**

**Photo – 4**

**The Survey Coordinator (Dr. B. J. Mahendra, in the center) at Kavaratti, Lakshadweep Islands. The helicopter used in the background.**