ANNUAL REPORT
(2014 – 2015)

NATIONAL INSTITUTE FOR RESEARCH IN ENVIRONMENTAL HEALTH
(Indian Council of Medical Research)
Bhopal – 462 001 (M.P.)

ANNUAL REPORT
2014-15

NATIONAL INSTITUTE FOR RESEARCH IN ENVIRONMENTAL HEALTH
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National Institute for Research in Environmental Health

(Indian Council of Medical Research)
Department of Health Research
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Goal

To understand the mechanisms of chemical–induced injury through basic, clinical, translational and community research and to develop diagnostic and therapeutic tools to chemical threat agents including toxic industrial and agricultural chemicals, toxins and other chemicals

Current Focus of Research

Bhopal Gas Disaster, Population Based Long Term Epidemiological Study, Genetics, & Cytogenetics, Chronic Obstructive Pulmonary Disease, Chronic Kidney Disease

STAFF POSITION

Director -in- Charge	:	Dr. Anil Prakash, Scientist G (w.e.f 1 November, 2014) Prof. Manoj Pandey, Scientist G (up to. 31 October, 2014)
Head of the Office	:	Dr. N. Banerjee, Scientist C

Epidemiology Division

Scientist B (Med)	:	Dr.(Mrs.) R. Galgalekar
Scientist B (Med)	:	Dr. K. K. Soni
Technical Assistant	:	Mr. A. M. Khan
Technical Assistant	:	Mrs. M. Chaturvedi
Technical Assistant	:	Mrs. A. N. Bhavsar
Technical Assistant	:	Mrs. H. Saxena
Technical Assistant	:	Mrs. S. Khare
Technical Assistant	:	Md. S. Khan
Technical Assistant	:	Dr. V. S. Rathore
Technical Assistant	:	Mr. U. S. Chauhan
Technical Assistant	:	Mrs. R. Sen
Technical Assistant	:	Dr. (Mrs.) A. Shukla
Technical Assistant	:	Mrs. R. Yadav
Technical Assistant	:	Mrs. S. Azhar
Technical Assistant	:	Mr. D. S. Shukla
Technical Assistant	:	Mr. R. K. Srivastava
Technical Assistant	:	Mr. B.K. Dixit
MTS (Tech)	:	Ms. Aysha Khan
MTS (Tech)	:	Mr. K. D. Sharma

Statistics Division

Scientist B	:	Mrs. M. Sharma
Technical Assistant	:	Mr. S. Khare
MTS (Tech)	:	Mr. M. Ahmed
MTS (Tech)	:	Mrs. R. Lalwani

Computer Division

Scientist C	:	Dr. S. Singh
Technician C	:	Mr. R. Chandrasekhran Pillai
Technician C	:	Mr. S. Sharma
Technician C	:	Mr. A. K. Kori
Technician A	:	Mr. R. K. Pandey
MTS (Gen)	:	Mr. Srikant Mishra

Administration

Private Secretary	:	Mr. Krishnadas V.K.
Section Officer (Adm)	:	Mr. S. Shrivastava
Section Officer (Acctts)	:	Mr. M. Waldhurkar
Technician B	:	Mr. R.K. Varma Thampuram
Technician A	:	Mrs. Anitha S. Pillai

Utilities

MTS (Gen)	:	Mr. D. Ugave
MTS (Gen)	:	Mr. P. Patva
MTS (Gen)	:	Mr. A. Husain
MTS (Gen)	:	Mrs. K. Bai

Attachment from BMHRC, Bhopal

Assistant Professor	:	Dr. R. M. Samarth
Asstt Administrative Officer	:	Mr. S. Subharwal

Advisors / Consultants

Advisor to DG	:	Dr. V. K. Vijayan
Consultant (Laboratory)	:	Dr. (Ms) Farida Khan
Consultant (Administration)	:	Dr. R. C. Sharma
Consultant (F & A)	:	Mr. S. S. Asthana (w.e.f 14 November 2014)

Project staff

1. Ms.Tanvi Chincholkar, RA
2. Ms. Jyotsana Pillai, SRF (Dec 2013-Feb 2015)
3. Ms. Priya Chitriv, RA
4. Mr. Aditya Banerjee, RA
5. Mr. Raza Ansari, Lab Tech
6. Mr. Imran Khan, Lab Tech
7. Dr. Y. Venkatesh, Sc B (Medical) (Dec, 2014 – Feb 2015)
8. Ms. Neha Jain, SRF (Sept, 2014 - April, 2015)
9. Ms. Chetna Dhampalwar, FI (June, 2014 - April 2015)
10. Ms. Srijena Chandra, Lab Tech (Dec, 2013 - April, 2015)
11. Ms. Amrita Singh Yadav, FI
12. Ms. Mamta Shilpkar, LA
13. Ms. Poonam Sharma, SRF
14. Mr. Imamul Haq
15. Mr. Arun R. Nair

From Director's Desk

I feel privileged to present the activities and achievements of NIREH during the year 2014-2015. The Institute is still in its infancy stage, cutting its teeth and obviously facing the teething troubles and various challenges. The National Institute for Research in Environmental Health came in to existence on 11th October, 2010 as the 31st permanent institute of ICMR in pursuance of Union Cabinet resolution, passed on 24th June, 2010, directing, interalia, ICMR to establish a new permanent research institute at Bhopal. Though the immediate focus of this Institute is on the health research needs of the gas exposed population of Bhopal, the Institute is mandated to focus on the entire issues of environmental health in long term.

NIREH continued the inherited Long Term Population Based Epidemiological Study on the Health Effects of the Toxic Gas in Bhopal and during the year completed 48th and 49th six monthly rounds of follow up surveys covering a cohort of about 30,000 people. In addition, work in five intramural projects was initiated. Modest services like Community based health services, a respiratory clinic and a respiratory physiotherapy centre were offered to the gas exposed persons by the Institute.

Process to fill up 57 scientific, administrative, nursing and engineering cadre posts for NIREH was initiated and it is hoped that with the infusion of new blood and talent scientific activities of the Institute will get much needed philip. Also the work on the construction of the new permanent campus of NIREH took off during the year. The upcoming NIREH campus in a 20 acres plot in Bhauri area of Bhopal is proposed to be a completely green campus with state of the art laboratory facilities and residences.

I take this opportunity to express my sincere thanks to Director General, Sr. DDG (Administration), Sr. Financial Advisor and Head, Division of Non-Communicable Diseases, ICMR for their keen interest, advice and constant guidance. Members of Scientific Advisory Committee, various Expert Groups, Advisors associated with NIREH, and my predecessor Director-in-Charge, NIREH have given their valuable contributions in the upliftment of NIREH and I express my gratefulness to them. Lastly, I acknowledge the efforts of all my colleagues at NIREH in various capacities in building up NIREH and taking it on the path of stability and progress.

Dr. Anil Prakash
Director-in-charge

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INDIAN COUNCIL OF MEDICAL RESEARCH
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Executive Summary

- Under the long term population based epidemiological study on the health effects of the toxic gas six monthly 48th (Feb-June, 2014) and 49th (Sept-Dec, 2014) rounds of surveys were completed. During the 48th round, 21,840 individuals from exposed areas to be in viz. severely exposed (n=7,827), moderately exposed (n=8,089) and mildly exposed (n=5,924) area; and 5,341 individuals from unexposed control areas were followed up. Any morbidity recorded was 22.8% in severely exposed, 17.6% in moderately exposed and 18.2% in mildly exposed areas which were way higher than 9.6% morbidity recorded in the control areas. During the 49th round of survey a cohort of 23,534 individuals from severely affected (n=7,851), moderately affected (n=8,515) and mildly affected (n=7,168) areas and 6,123 individuals from control areas were followed up recording 23.6% any morbidity in severely exposed, 16.3% in moderately exposed and 17.4% in mildly exposed areas compared to 9.5% in the control areas.

- A new study on the prevalence of morbidity of selected population with reference to the drinking water utilization was initiated. Epidemiological survey and medical examination was completed in 20 wards covering 4,369 individuals.

- In the study on cytogenetic analysis in MIC exposed population and their progeny a total of 1,027 eligible individuals were enrolled, counseling and pedigree analysis completed for 514 cases while sample collection, processing and karyotyping was completed for 106 cases.

- Under the long term genetic effects of MIC gas, if any, on the Bhopal population exposed in December 1984 study a total of 174 subjects fulfilling the inclusion criteria were cenrolled and their 3 generation pedigrees prepared. Cytogenetic analysis of 22 samples was completed.

- Thirty subjects of COPD, fulfilling the inclusion criteria were recruited in the study entiled evaluation of biochemical markers in clinically stable cases of COPD in gas affected population. Six chosen markers were analyzed in their serum.

- A total of 119 gas exposed individuals were benefitted by the respiratory clinic, being run at the Institute. Under the community based health services in severely exposed areas referral and door step ambulance service was availed by 62 needy ill patients and 20 patients of COPD were provided pulomonary rehabilitation services at the respiratory physiotherapy centre.

- Construction of permanent campus started by the Capital Project Administration, Govt of Madhya Pradesh at Bhauri village, situated on Bhopal-Indore by pass road.

- Phase I recruitment process for 57 permanent posts was initiated

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Research Work

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Project -1 : Population based long term epidemiological study on the health effects of the toxic gas exposure in Bhopal

Investigators: (i) Team BGDRC (Jan 1985 – May 1994) - ICMR
Duration & Funding (ii) Team CRS (Jan 1996 – Jan 2011) - Govt of M.P.
(iii) Team NIREH (Feb 2011 onwards) - ICMR

Investigators from NIREH : Dr. N. Banerjee (PI); Dr. S. Singh, Dr. R. Galgalekar, Dr. K. K. Soni, Mrs. M. Sharma

The population based long term epidemiological study on the health effects of the toxic gas exposure was continued during the year. This 3 decades long study has provided valuable information related to immediate and long term morbidity patterns in the gas exposed population and changes in socio demographic profile over time. In this study the morbidity and mortality data is being collected at six monthly intervals in the registered study cohort of gas exposed and unexposed (control) families using a structured health survey questionnaire by trained field workers.

To recapitulate, after the gas disaster this study was launched in 1986 under Bhopal Gas Disaster Research Centre, (BGDRC) ICMR on a cohort of 62,706 individuals from gas exposed area (19,260, 28,261 and 15,185 from severely exposed, moderately exposed and mildly exposed areas respectively) and 13,526 individuals from non-exposed areas (Control) of Bhopal. The study under BGDRC continued till 1994 and later was handed over to Centre for Rehabilitation Studies (CRS), Govt. of M.P. which carried it out between 1996 and 2010 following the same protocol on a cohort of 34,480 individuals from exposed areas (10,816 from severely exposed areas, 14,137 from moderately exposed areas and 9,527 from mildly exposed areas) and 7,990 individuals from unexposed control areas which was a part of the original cohort. Since its establishment in Oct 2010, the study was taken over by NIREH. In 2011, when NIREH took over the study from CRS, a substantial part of cohort was lost gradually due to variety of reasons such as shifting of population to different places, marriage related migration and deaths and only the cohort of 16,860 exposed individuals (5,658, 6,533 and 4,669 from severely, moderately and mildly affected areas respectively) and 5,741 individuals from the non-exposed control areas was available for the follow up. Special drives undertaken during 2013-2014 and 2014-2015 by NIREH resulted in tracing and addition of about 7,000 individuals from the lost cohort.

1.1 Pattern of morbidities (2014 – 2015)

During the reporting year two rounds of six monthly surveys were carried out- the 48th round (February-June, 2014) and 49th round (September-December, 2014).


Epidemiological survey in progress


1.1.1 48th round of survey: During the 48th round of survey 21,840 individuals from exposed area *viz.* severely exposed (7,827), moderately exposed (8,089) and mildly exposed (5,924) areas; and 5,341 individuals from unexposed control area were followed up. Any morbidity recorded was 22.8% in severely exposed, 17.6% in moderately exposed and 18.2% in mildly exposed areas which were way higher than 9.6% morbidity recorded in the control areas (Fig-1). Similar trends of higher morbidities of respiratory disorders, ophthalmic disorders and gastrointestinal disorders in the exposed areas as compared to control areas were recorded. The skin morbidity was, by and large, similar in severely exposed (0.67%), moderately exposed (0.4%), and mildly exposed (0.43%) areas which, however, was slightly higher than the control (0.33%) areas.

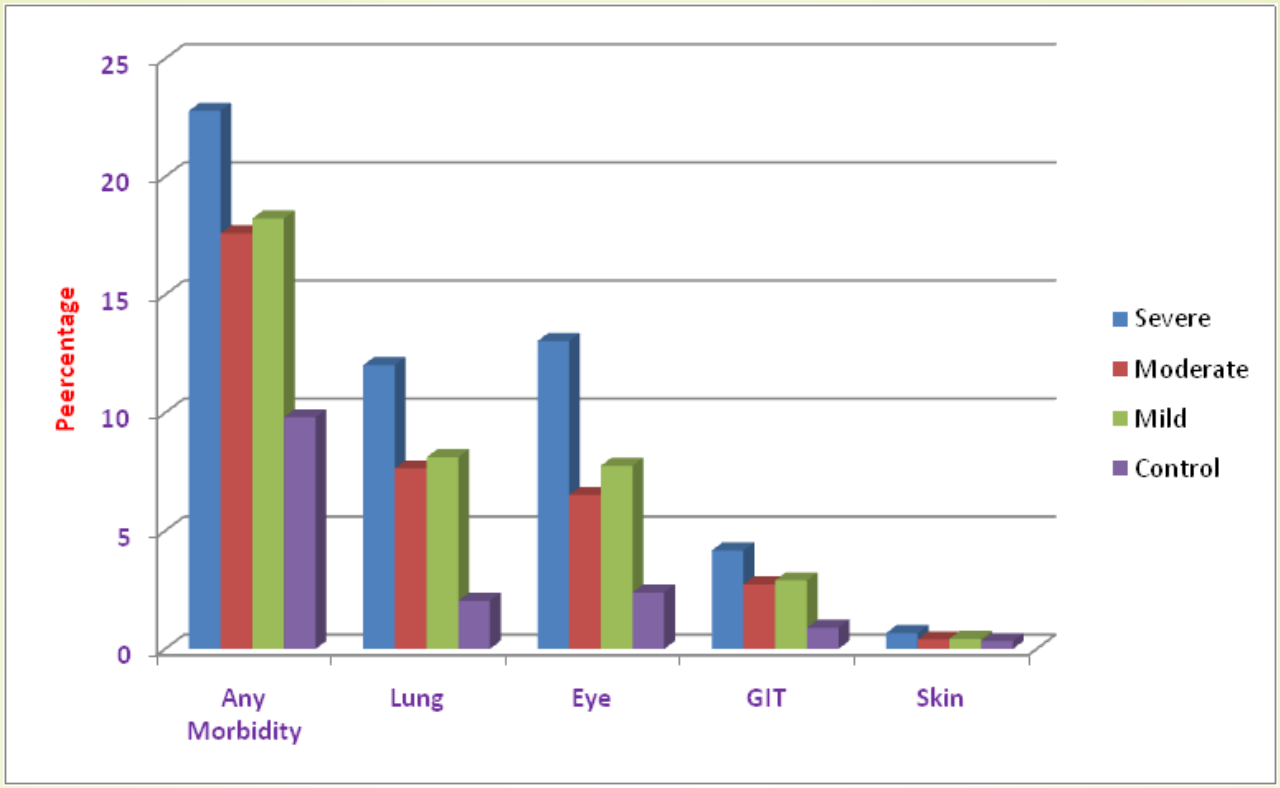

Fig-1: Morbidity trend recorded in 48th round of survey (Feb-June, 2014)

1.1.2 49th round of survey: During the 49th round of survey a cohort of 23,534 individuals from severely exposed (n=7,851), moderately exposed (n=8,515) and mildly exposed (n=7,168) areas and 6,123 individuals from control area was followed up. Overall trend of morbidity pattern in this round remained, by and large, similar to the 48th round of survey (Fig-2). Any morbidity recorded was 23.6% in severely exposed, 16.3% in moderately exposed and 17.4% in mildly exposed areas compared to 9.5% in the control area. The respiratory morbidity rates remained high in the severely exposed area (12.5%) in comparison to moderately exposed area (7.3%), mildly exposed area (9.2%) and control area (2.1%) and so were ophthalmic respiratory rates (severely exposed 15.5%, moderately exposed 6.8%, mildly exposed 7.6%, control 1.8%) as well as gastro intestinal morbidity rates (severely exposed 4.2%, moderately exposed 2.1%, mildly exposed 2.8%, control 0.94%). Magnitude of skin morbidity recorded was, by and large, similar ranging from 0.57% in severely exposed to 0.26% in control areas.

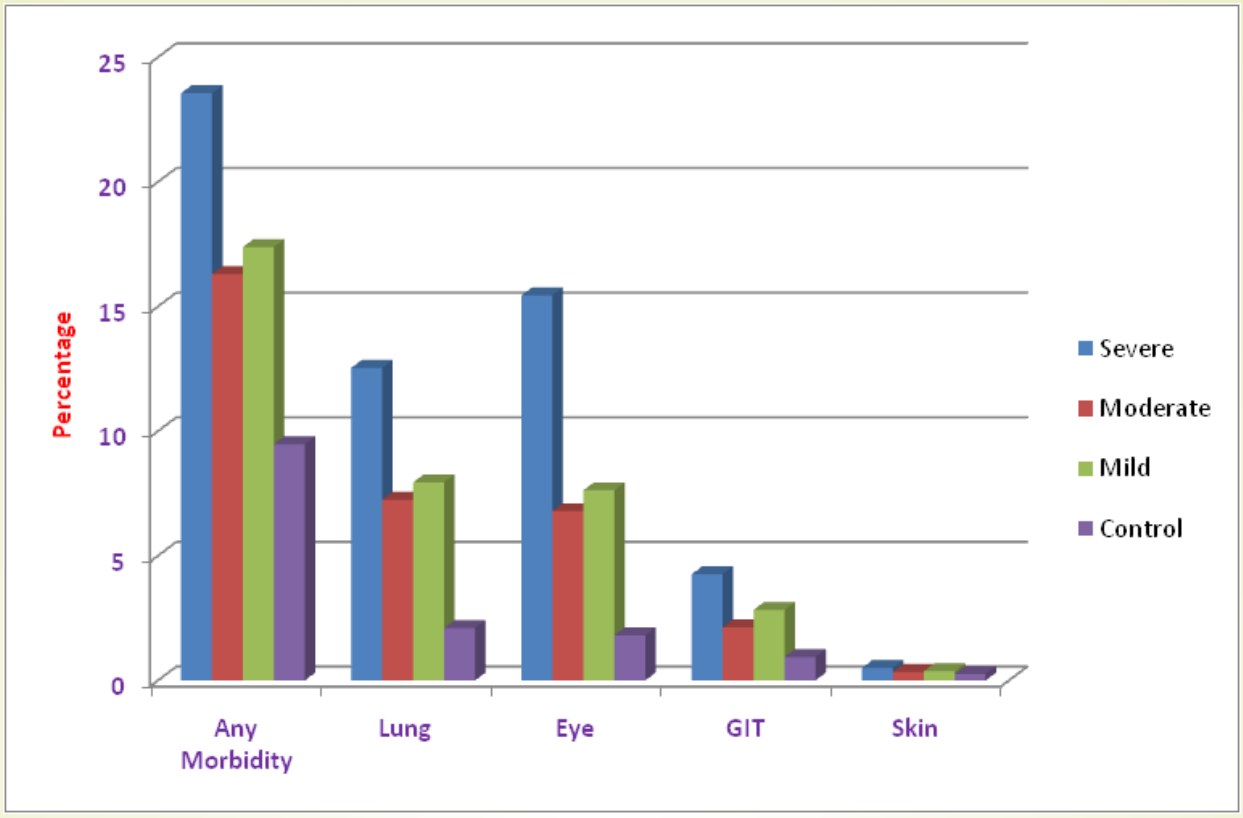

Fig-2: Morbidity trend recorded in 49th round of survey (Sept-Dec, 2014)

1.2 Pattern of mortalities (2014-2015)

Overall mortality rates in the 48th survey were found to be the same in the exposed (4.48/1000 population) and control areas (4.49/1000 population). However, mortality due to respiratory disorders in the exposed area (2.15/1000 population) was nearly three times higher than the control (0.74/10). In 49th survey overall mortality rates were 4.5/1000 population in the exposed and 4.1/1000 population in control areas. Death due to respiratory disorders in the exposed area (1.6/1000 population) was nearly five times higher than the control (0.32/1000 population) area (Table-1).

Table-1 : Primary causes of death as recorded in 48th and 49th rounds of survey

Cause of death	Exposed area		Control area	
	48th	49th	48th	49th
	Number (%)	Number (%)	Number (%)	Number (%)
Accident &Injuries	3 (3.06%)	6 (5.66%)	2 (8.33%)	1 (6.25%)
Child birth & Pregnancy	0 (0.0%)	1 (0.94%)	0 (0.0%)	0 (0.0%)
Fever	2 (2.04%)	3 (2.83%)	2 (8.33%)	1 (6.25%)
Digestive disorders	7 (7.14%)	11 (10.37%)	1 (4.16%)	2 (12.50%)
Respiratory disorders	47 (47.95%)	38 (35.84%)	4 (16.66%)	2 (12.50%)
C.N.S. disorders	4 (4.08%)	7 (6.60%)	1 (4.16%)	0 (0.0%)
C.V.S. disorders	13 (13.26%)	13 (12.26%)	6 (25.0%)	6 (37.50%)
Other system disorders	15 (15.3%)	16 (15.09)	0 (0.0%)	2 (12.50)
Senility	5 (5.1%)	6 (5.66%)	1 (4.16%)	1 (6.25%)
Cause unknown	2 (2.04%)	5 (4.71%)	7 (29.16%)	1 (6.25%)
Total deaths	98	106	24	16
Mortality rate (per 1000)	**4.48**	**4.5**	**4.49**	**4.1**

Project-2: A study on the prevalence of morbidity of selected population/families with reference to the drinking water utilization

Investigators: Dr. N. Banerjee (PI); Dr. S. Singh, Dr. R. Galgalekar, Mrs. M. Sharma

Advisor : Dr. H. R. Rajmohan

Duration : $1^{1/2}$ Year (June 2014-Nov 2015)

Funding : ICMR (IM)

Consumption of allegedly contaminated ground water resulting in various morbidities in the population living around Union Carbide India Limited (UCIL) factory premises, Bhopal after the gas accident still remains an important environmental issue which needs scientific answer. In this backgorunt the present study was initiated to determine the morbidities in the select population with reference to the use of water sources for drinking purpose at variable distances from UCIL premises, and correlation, if any, between observed morbidity and drinking water consumption.

Two areas located at variable distances from the UCIL factory i.e. 0-1 km radius area from the boundary wall of UCIL (Stratum-I- covering 7 municipal wards) and 2.5-5.0 km radius area from the boundary of UCIL (Stratum II-covering 32 municipal wards) were selected for the study (Fig-3). Sample size comprised of 1,092 families in each stratum. Families,

Fig-3: Map of Bhopal city showing Stratum I-(Red circle) and Stratum II- (Green circle)

selected on the basis of stratifed random sampling procedure, in both the strata were aporoached and all members of the family surveyed through a structured questionnaire and all available members at the time of survey were subjected to medical examination. Random selection of the families for the survey was achieved by approaching every 35th family in Stratum I and 156th family in Stratum II. So far, survey has been completed in 4 wards in Stratum I and 16 wards in Stratum II covering 861 families (423 families in Stratum I, 438 families in Stratum II) encompassing 4,369 individuals (2,173 individuals in Stratum I, 2196 individuals in Stratum II). Of the surveyed individuals 26.4% in Stratum I and 22.6% in Stratum II were reported to be exposed to toxic gas in 1984.

Field survey/clinical examination in progress

The age distribution of the individuals surveyed in the two strata was comparable (Fig-4).

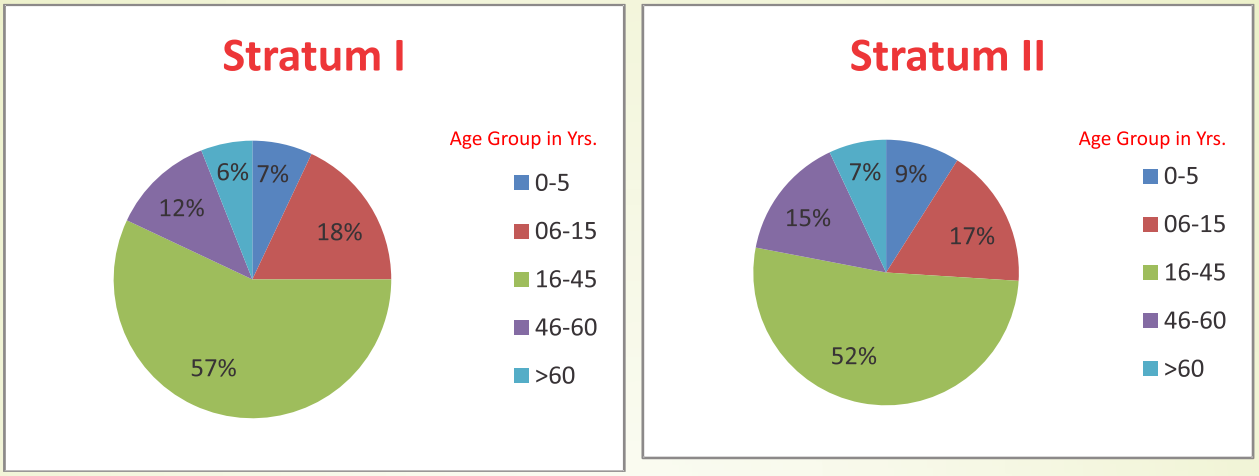

Fig-4: Age distribution of surveyed individuals

2.1 Present drinking water source

Information related to the present drinking water source in the surveyed families was collected (Table-2). The municipal source of drinking water includes piped water supplied in houses, public taps/ standpipes, and supplied by tankers. The sources such as bore wells, tube wells, dug wells, surface water etc., are considered non-municipal. With regard to treatment of drinking water at home in any form, such as use of water purification systems, boiling and alum treatment, 25.9% families in stratum I and 35.1% in stratum II, carried out some form of drinking water treatment prior to its consuming.

Table-2: Distribution of surveyed families as per drinking water source

Source of Drinking Water	Stratum I (n=423)	Stratum II (n=438)
Municipal	345	368
Non-Municipal	78	70

2.2 Clinical examination

During clinical examination both present and any significant past morbidities were recorded. About 25% of the individuals examined in both the strata were found to be suffering from one or the other kind of illness at the time of examination including respiratory ailments, diabetes, hypertension and other CVS related diseases, hyperthyroidism, skin related diseases etc.

Table-3: Morbidity status in the clinically examined individuals in the two strata

Stratum I			Stratum II		
Total individuals surveyed	**No. individuals clinically examined**	**No. morbid (%)**	**Total individuals surveyed**	**No. individuals clinically examined**	**No. morbid (%)**
2173	1572	394 (25.1)	2196	1724	424 (24.6)

Project-3 : Cytogenetic analysis in Methyl Isocyanate (MIC) exposed population and their progeny

Investigators: Dr. N. Ganesh, JNCHRC, Bhopal (PI), Dr. N. Banerjee, NIREH, Bhopal (Co PI)

Duration: 2 Years (Nov 2013-Oct 2015)

Funding: ICMR (IM)

This study is exploring the present chromosomal status of toxic gas exposed survivors and the genetic effects on the progenies born to exposed individuals with the aim to estimate the levels of risk of developing any genetic disorders. The sample size for the study was 1,200 individuals of both sexes in 29-59 years age-range belonging to six categories *viz.* toxic gas exposed, unexposed, 1st and 2nd generation progeny born after exposure, those suffering from different ailments, and those with congenital malformation. The chromosomal analysis included GTG banding and confirmation of Trisomies on GTG banded slides through FISH, sister chromatid exchanges, C banding along with pedigree analysis of gas exposed individuals.

Study subjects were randomly selected from the hospital registration 2013-2014 of Jawahar Lal Nehru Cancer Hospital and Research Centre (JNCHRC) following defined inclusion and exclusion criteria. So far, a total of 1,027 eligible individuals have been enrolled. Counseling and pedigree analysis has been completed for 514 cases. Sample collection, processing and karyotyping has been done for 106 cases.

Blood culture for chromosomal assay

Scoring metaphase & counting chromosomes

Project-4 : Long term genetic effect(s) of MIC gas, if any, on the Bhopal population exposed in December, 1984

Investigators: Dr. B. B. Ganguly, MGMIHS, Mumbai (PI), Dr. N. Banerjee, NIREH, Bhopal (Co PI)

Duration: 2 Year (Nov 2013-Dec 2015)

Funding: ICMR (IM)

In this pilot study the cytogenetic status of 100 gas exposed and 100 unexposed individuals from Bhoapl, among those screened earlier (1986-1990) under the multi-centric genetic screening study of ICMR involving 6 centers including Bhopal, is being examined and compared with the previous genetic status to exclude the possibility of long term effects, if any, of the toxix gas exposure. The study envisages preparation of 3-generation pedigree along with clinical examination and screening for current status of spontaneous chromosomal aberrations in first cycle mitotic cells (M1) of PHA-stimulated lymphocyte culture, constitutive aberrations by G-banding in second cycle mitotic cells (M2) and cryptic rearrangements by FISH technique. Among the 800 retrieved pre-screened (1986-1990) cases in Bhopal (543 exposed, 257 unexposed) only 267 were traceable in Bhopal. Of these traceable cases, 174 (129 exposed, 45 unexposed) were contacted and their 3- generation pedigrees were prepared. Information such as exposure history, family size, general health status etc. was also collected. Cytogenetic analysis of limited no. of blood samples (n=22) revealed cultures with low mitotic index (36% cases), assemblage of D/G group (>90% cases) and spontaneous aberration (22% cases).

Sample processing in the laboratory

Project-5: To evaluate biochemical markers in cases of clinically stable stages of Chronic Obstructive Pulmonary Disease (COPD) in MIC affected population

Investigators: Dr. Farida Khan, Consultant, NIREH, Bhopal (PI); Dr. R. Galgalekar, NIREH,, Bhopal , Dr. K. K. Soni, NIREH, Bhopal

Duration: $1^{3/4}$ Year (Nov 2013-Aug 2015)

Funding: ICMR (IM)

Chronic obstructive pulmonary disease (COPD) is a cumulative term coined for the co-existence of two diseases, chronic bronchitis and emphysema. COPD is a slow progressive disorder of lungs and is defined as irreversible obstruction of the airway as against reversibility observed in asthma. There are many potential players identified as causative factors for this disease. Smoking predominates in all conditions as 90% of the COPD patients are smokers. Other factors involve inhalation of noxious particles, exposure to toxic gases, chemicals, indoor and outdoor pollution, allergens and frequent respiratory infections and in some cases genetics, physiological condition and stress.

Respiratory disorders in the toxic gas exposed population of Bhopal have been found to be very high of which a good proportion are COPD cases. In a bid to find a reliable, robust and reproducible biomarker for potential prognostic use in COPD cases this pilot study envisages to evaluate six biomarkers (SP-D, MMP-9, TGF β_1, CC-16, CCL 18 and MCP-1/CCL2) for their expression and quantification in serum and sputum of clinically stable cases of COPD among gas exposed population of Bhopal. The biomarkers are being evaluated in 30 clinically stable mild, moderate and severe COPD cases (10 of each category) according to GOLD standard with no co-morbidities and 10 healthy subjects fulfilling the exclusion and inclusion criteria.

Laboratory work in progress

Subjects were recruited (30 COPD cases and 8 healthy volunteers) and information was collected from each subject on the severity of gas exposure, smoking habits, medical history, routine lab investigations and preliminary assessment of lungs by X-ray and pulmonary function test. After standardization of laboratory protocols serum of the subjects was analyzed for various markers by ELISA. The results show a clean correlation with most of the markers and the severity of the COPD disease. Although one/two markers recorded universally high values, a clear variation was not observed among different stages of COPD. The detailed correlation with progression of disease is being analysed. Because of various technical and operational constraints related to the collection of induced sputum from the COPD cases the work on evaluation of these markers in the sputum has not progressed satisfactorily.

Project-6: Genetics and epigenetics of lung function among the victims of Bhopal gas disaster

Investigators: Dr. Vipin Gupta, DU (PI), Dr. N. Banerjee, NIREH, Bhopal (Co PI), Dr. Raj Kumar, VP Chest Institute (Co PI), Dr. G. K. Walia, PHFI (CI), Dr. P. Dhillon, PFHI (CI)

Duration: 1 Year (Nov 2013-Oct 2014)

Funding: ICMR (IM)

This study envisaged to assess the effects of genetic variations (allele frequency and size effect of the selected gene polymorphism) related to lung functions among the toxic gas exposed population of Bhopal, and gene-environment interaction through epigentic assays in relation to lung functions in a sub set of severely exposed subjects together with their unexposed healthy siblings.

From the NIREH database of 6,968 individuals, based on the availability and satisfying the inclusion criteria (gas victims of 40-70 years age whose PFT was done in 1990s), 466 individuals from exposed and 420 from unexposed areas were identified . Further, from BMHRC database (between 2002-2008), 809 individuals were shortlisted. A total of 110 samples from subjects residing in the severely exposed areas were collected and their anthropometric (height, weight and circumference) and physiological measurements (blood pressure, PFT before and after bronchodilator) were recorded. Information through structured questionnaire was collected from the study subjects on COPD risk factors (family history, tobacco smoking, chewing, indoor pollution) and other related aspects (socioeconomic status, diet, physical activity).

Subsequently due to various technical and administrative problems this study was terminated by the ICMR in Oct 2014.

OTHER ACTIVITIES

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Special Respiratory Clinic

Under this programme severely ill cases having respiratory complaints, identified during the field surveys, are transported to NIREH pulmonary clinic where they are clinically examined and advised. Their blood investigation and X-ray are done at Kamla Nehru Hospital while ECG and PFT are carried out at NIREH. During the reporting year a total of 41 new parients (males 27, females 14) attended the respiratory clinic while 78 old patients (males 64, females 14) were followed up at the respiratory clinic.

Patients undergoing investigations at NIREH

A patient being examined in the clinic

Community based health services

Community based health services being provided by NIREH to the gas exposed people in severely affected areas continued during the year. Under this programme needy morbid subjects in the severely affected areas, identified during the epidemiological surveys, are examined by a physician of NIREH at their door steps and, if needed, are transported to BMHRC or referred to

other government hospitals for investigations and treatment on every Friday. During the year 62 patients (males 42, females 20) availed the referral ambulance service of BMHRC.

A gas exposed person availing door step referral ambulance service

Respiratory Physiotherapy Centre

Community based pulmonary rehabilitation activity at Kenchi Chhola Health Centre of BMHRC was continued by NIREH. Under this activity a qualified part time Physiotherapist has been providing pulmonary physiotherapy services on regular basis at this health centre. All identified willing COPD patients screened by NIREH doctors are referred for respiratory physiotherapy which has been found to be very effective and has shown a definite improvement in the disability level of chronic patients. During the year 20 patients of COPD from severely affected areas were benefited under this programme.

A COPD patients undergoing tri flow lung volume exercise at respiratory physiotherapy centre

IMPORTANT EVENTS

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नई दिल्ली

1. NIREH Foundation Day, 2014

Fifth Foundation Day of NIREH was celebrated on 11th October, 2014. Dr. M. N. Buch, Retd IAS and considered as the architect of the modern Bhopal was the Chief Guest and Dr. B. P. Dubey, Dean Gandhi Medical College, Bhopal was the Guest of Honour on the occassion. After the ceremonial invocation of goddess Saraswati the welcome address was given by Dr. N. Banerjee, Head of the office. Prof. Manoj Pandey, Director I/C of NIREH in his address gave the history of the establishment of NIREH and appraised the audience about the highlights of the ongoing research activities of the Institute and proposed future work.

Dr. Buch delivering the NIREH Foundation Day Oration on Environment and Health, stated that protecting environment is the responsibility of all the stake holders and emphasized that the efforts of health personnel in tackling various diseases need to be supplemented by the efforts of the community themselves and strict enforcement of the legislations. Community awareness of keeping their surroundings clean, protecting the environment and adopting simple hygienic habits can bring down the burden of various vector-borne and gastrointestinal diseases to a great extent. Behaviour modification of the community stake holders to change some religious practices such as immersion of idols in rivers and ponds on various festivals, thus, polluting the water considerably, is urgently needed for which IEC tools need to be developed and implemented at the grass root level. He hoped that NIREH will work on such issues and translate its research findings for improving the environment and community health.

Guests on the dais

Prof Manoj Pandey addressing the gathering

Dr. M.N. Buch delivering Foundation day oration

Dr. M.N. Buch receiving Foundation Day Oration Award

Dr. Ravinder Singh, Scientist C, Division of NCD spoke on Pesticides, Environmental and Human Health. He presented the data of pesticidal load on the environment in agriculture and public health sectors along with long term effects of pesticide exposure on human health. He dealt with the routes of entry, pesticide formulations, chemical groups of available pesticides, measurements of acute toxicity and safety measures for pesticide exposure.

Dr. Ravinder Singh delivering lecture

Dr. Ravinder Singh receiving the memento

Dr. B. P. Dubey deliberating on the deterioration of environment and its adverse effects on human health said that most often it is the human greed that accelerates the degradation of environment hence there should be multi prong attack from all sectors to save the environment.

Dr. B. P. Dubey addressing the gathering

Dr. B.P. Dubey receiving the memento

The function ended with a vote of thanks by Dr. Anil Prakash, Scientist F.

2. Vigilance Awareness Week (Satarkta Jagrukta Saptah), 2014

The Vigilance Awareness Week (27.10.2014 -1.11.2014) was observed in NIREH with vigour and enthusiasm. The theme for the year was "Combating Corruption – Technology as an enabler". On October, 27, 2014, Dr. Anil Prakash, Scientist-F administered pledge to all the officers and staff of the Institute to maintain dignity, integrity, transparency in all works in achieving the goals of the Institute. In his address Dr. Prakash emphasized on the importance of vigilance awareness and requested the staff members to work without fear or favour to achieve the growth and reputation of the Institute and to strive for eradicating corruption in all spheres of life. During the week slogan and poster competitions were organized among the staff members of NIREH.

On 31st October, 2014 a guest lecture by Major General Kamaljit Singh was delivered in the Conference Hall of NIREH. In this lecture Mr. Singh dwelled on the issues of corruption in public life and how corruption is eroding the national resources and affecting the good governance. He focused on the usefulness of information technology tools such as e-file movement, e-tendering, office automation etc. in promoting the transparency and combating the corruption. The lecture of Major General Singh was very informative and interactive which was extremely well received by the NIREH staff.

Lecture being delivered by Major General Kamaljit Singh

Major General Singh distributing prize to the winner of Slogan Competition

Major General Singh distributing prize to the winner of Poster Competition

After the lecture Prof. Manoj Pandey, Director I/C., NIREH presented a memento to the speaker as a token of appreciation and Major General Singh distributed prizes to the winners of slogan and poster competitions. At the end Mr. S. Subherwal, AAO offered vote of thanks.

3. Rashtriya Ekta Diwas

NIREH observed the birth anniversary of Late Shri Sardar Valabhbhai Patel as `Rashtriya Ekta Diwas (National Unity Day)' on 31 October, 2014. All staff members gathered in the conference Hall at 9.30 AM. The video recording of the speech by Dr. V.M. Katoch, Secretary, Department of Health Research and Director General, ICMR was telecast. All the staff members of NIREH took the pledge of unity and integrity administered by DG, ICMR through the telecast. After the pledge, Dr. Anil Prakash, Scientist-F spoke on the role played by Bharat Ratan Sardar Patel in integrating the then Princely states of India giving shape to the present day India. He also spoke on the importance of unity and integrity by individuals and their families as a service to nation, society and institution.

Video telecast of speech of DG, ICMR on Rashtriya Ekta Diwas

4. Swacch Bharat Mission

The ambitious project of the Hon'ble Prime Minister `Swachh Bharat Mission' was launched through out the country on 2nd October, 2014. On this day, Dr. Anil Prakash administered the Cleanliness Pledge to the NIREH staff followed by voluntarily cleaning of office premises from inside and out side by the staff members. Kar Sewa is being organized by NIREH officials every Friday between 4.30-5.30 PM to clean vulnerable areas in and around NIREH premises.




Glimpses of cleanliness pledge being taken by NIREH staff and Kar Sewa around NIREH premises under Swachh Bharat Mission

5. Scientific Advisory Committee meeting

Fourth SAC meeting of NIREH was held on 27th December, 2014 under the Chairmanship of Dr. V. M. Katoch, DG, ICMR. The meeting was Co-Chaired by Lt. Gen (Dr.) D. Raghunath. Expert members Prof. N. K. Mehra, Dr. V. K. Vijayan, Dr. S. K. Dave, Dr. Sunita Saxena, Dr. Raj Lakshmi Gope attended the meeting in addition to officials from ICMR such as Mr. Sanjiv Datta, Dr. D. K. Shukla. Committee reviewed the ongoing activities of NIREH and provided valuable advice on ongoing projects and new projects to be taken up and other matters related to NIREH.


Glimpses of 4th Scientific Advisory Committee Meeting of NIREH

6. Sensitization meeting on Wild Life Protection Act

To sensitize NIREH staff and their families on Wild Life Protection Act, 1972, a lecture was organized on 12th January 2015. Shri Chandrsekhar Dubey, Assistant Conservator of Forest, National Park (Van Vihar), Bhopal was the invited speaker on this occasion who delivered a informative and interactive talk on the provisions and schedules of Wild Life Protection Act 1972 and briefed on penalties imposed under various schedules on violating the act.


Invited speaker delivering lecture on Wild Life Protection Act

Further, he appraised the audience about various endangered animals and plant species and highlighted the need of conservation. The lecture was attended by about 50 officials of NIREH and their family members.

Library

NIREH library is having access to ProQuest Medline Library (PML) data base providing full text online access to 3,500 biomedical journals, and ICMR customized Journal Custom Content Consortia (JCCC-ICMR) covering 693 full text journals and 215 open access journals. Other available library resources include the online journals through Electronic Resources in Medicine (ERMED). In addition, library is also having access to 4 leading bio-medical journals *viz.* Lancet, Science, Nature and New England Journal of Medicine.

Views of the library

Presently NIREH library is maintaining a core collection of only about 100 books in areas like Bhopal Gas Disaster, Biomedical Science, Computer Science, and Bio-statistics. Library also has got a good collection of various documents, publications, reports of seminars and workshops etc. related to Bhopal Gas Disaster and related environmental health issues. The library is equipped with 2 computers with internet connectivity to help researchers in pursuit of their academic activities. The up gradation of library is in progress.

Science Journal Club

In order to inculcate scientific temper, public speaking and presentation skill the meeting of a Science Journal Club of NIREH was organized on every Friday during the year wherein a speaker among the NIREH/project staff was invited to present a talk on the subject assigned to him in advance (Table-4). The talk was followed by lively discussion and Q & A session from the audience.

Table-4: Speakers in the weekly Journal Club of NIREH

Sl. no.	Date	Topic	Speaker
1.	24.01.2014	Inhibition of proliferation of cervical and leukemic cancer by Penicillin G	Aditya Banerjee, RA
2.	31.01.2014	Prevalence of Bovine Viral Diarrhoea virus types and subtypes in cattles in oraganised dairy farms in India	Anil Verma, RA
3.	07.02.2014	Antibiotic resistance among *E. Coli* isolates from stool samples of children aged between 3-14 years from Ujjain, India	Imran Khan, Lab Technician
4.	14.02.2014	Biosafety	Arun R. Nair, Lab Technician
5.	21.02.2014	In situ hybridisation	Jyotsnaa Pillai, SRF
6.	07.03.2014	Evaluation of radioprotective potentiality of 50% methanolic extract of *Adhatoda vasica*: Cyto-geno Analysis	Poonam Sharma, SRF
7.	14.03.2014	Morphological Classification of Anaemia	Mohd. Raza Ansari, Lab Assistant
8.	28.03.2014	Genetics of COPD	Tanvi Chincholkar, RA
9.	04.04.2014	A study to screen tribal communities residing in Gondia district, Maharashtra, for beta-Thalassemia	Priya Chitriv, RA
10.	11.04.2014	Elucidation of cytotoxicity. Radioprotective and anti-cancerous property of *Mentha piperita*	Dr. Ravindra Samartha, Assistant Professor
11.	11.04.2014	ABC of Statistics	Prof. Manoj Pandey, Director
12.	25.04.2014	Statistics- Bias	Prof. Manoj Pandey, Director
13.	02.05.2014	Ethics and Misconduct	Prof. Manoj Pandey, Director
14.	16.05.2014	Micro RNA in COPD	Aditya Banerjee, RA
15.	23.05.2014	Molecular Cytogenetics, Automation and Visual Karyotyping	Arun R. Nair, Lab Technician
16.	30.05.2014	Pulmonary Function Test and their Interpretation	Imran Khan, Lab Technician

17.	13.06.2014	Single Nucleotide Polymorphism Array	Jyotsnaa Pillai, SRF
18.	20.06.2014	Chromosomal Disorders and Human Diseases	Poonam Sharma, SRF
19.	27.06.2014	Exome Sequencing	Priya Chitriv, RA
20.	04.07.2014	Clinical Biochemistry	Mohd. Raza Ansari, Lab Assistant
21.	18.07.2014	Basics of DNA Sequencing	Tanvi Chincholkar, RA
22.	25.07.2014	Hepatitis	Puneet Gupta, Lab Technician
23.	22.08.2014	Environmental Health	Sibi Thomas, Staff Nurse
24.	05.09.2014	Fluorescent In Situ Hybridisation	Imamul Haque, JRF
25.	12.09.2014	Statistics- Analysis of Data	Dr. Sushil Singh, Scientist-C
26.	19.09.2014	Statistics- Classification of Data	Dr. Sushil Singh, Scientist-C
27.	17.10.2014	Statistics- Type of Sampling	Dr. Sushil Singh, Scientist-C

Construction of NIREH Campus at Bhauri

Govt of Madhya Pradesh allotted free of cost 8.0 hectares of land at Bhauri village, situated on Bhopal-Indore by pass road for constructing permanent residential and office campus of NIREH. The site is located at a distance of about 7 km from Raja Bhoj Air port, Bhopal in the vicinity of Indian Institute of Science, Education and Research (IISER). The proposed build up area of the NIREH building is 26,359 sq meters (including space for core laboratory block, administrative block, auditorium, animal house, utility, guest house and residential quarters) with an estimated cost of Rs. 96.0 crores and a time line of 3 years. Capital Project Administration, Govt of M.P. has been appointed as Project Management Consultant by ICMR. After Bhoomi Poojan the construction activity started on 20th February, 2015 with the erection of boundary wall and construction of security gate complex.

Boundary wall construction of NIREH campus site, Bharui

SFC memorandum on establishment of NIREH with a proposed cost of Rs. 147.27crores, including expenses on project administration and consultation fee etc., has been approved by the Standing Financing Committee in its meeting held on 25/2/2015.

Phase I staff recruitment for NIREH

A total of 184 permanent posts belonging to Scientific cadre (66), Technical cadre (84), Administrative cadre (26) and Engineering cadre (8) have been sanctioned by the Govt of India for NIREH. Forty staff members are already in place and process for recruitment of 57 scientific, administrative, technical and engineering posts in Phase I is underway.

Meetings / Trainings / Seminars attended

Dr. Anil Prakash, Director-in-Charge

1. 9th Advisory Committee Meeting on Gas Rahat constituted by Hon'ble Supreme Court (9 April, 2014) at BMHRC, Bhopal
2. Meeting to review ongoing projects of NIREH, Bhopal (17 June, 2014) at ICMR Hqts, New Delhi
3. 10th Advisory Committee Meeting on Gas Rahat constituted by Hon'ble Supreme Court (4 July, 2014) at ICMR Hqts, New Delhi
4. CME on Haemovigilance Programme of India (8 August, 2014) organized by National Institute of Biologicals & Indian Pharmacopoeia Commission, MOH & FW, GOI at BMHRC, Bhopal
5. Meeting of the Epidemiological Research Expert Group of NIREH (13 August, 2014) at NIREH, Bhopal
6. Expert Group meeting to develop and evaluate the project proposal entitled Chronic Kidney Disease-Prevalence and role of Environmental and Occupational Factors (5 September, 2014) at BMHRC, Bhopal
7. Meeting of the Genetics Research Expert Group of NIREH (8 September, 2014) at NIREH, Bhopal
8. Meeting to discuss issues related to NIREH (29 October, 2014) at ICMR Hqts, New Delhi
9. Meeting to discuss issue of unique ID number to all gas affected individuals in Bhopal (11 November, 2014) at ICMR/DHR, New Delhi
10. National Seminar on Medical Issues of gas victims of Bhopal (30 November, 2014) organized by Sambhabna Trust, Bhopal
11. Meetings of Screening Committee for Dissertation Programme 2015 of BMHRC (6, 13 and 20 December, 2014) at BMHRC, Bhopal
12. Meeting of Epidemiological Research Expert Group to discuss issues related to ICMR in NGO's representation given to Govt of India regarding revision of death figures in the curative petition (16 January, 2015) at ICMR Hqts., New Delhi
13. Selection Committee Meetings for the posts of Scientist E of NIREH (27 and 29 January, 2015; 3 and 19 February, 2015) held at ICMR Hqts., New Delhi
14. Meeting of SFC Committee to consider NIREH SFC proposal (25 February, 2015) held at DHR/ICMR Hqts., New Delhi
15. Meeting related to the disbursement of ex-gratia to Bhopal Gas Victims (2 March, 2015) held at Department of Chemicals & Petrochemicals, Ministry of Chemicals & Fertilizers, New Delhi

Dr. N. Banerjee, Scientist C

1. Meeting to review ongoing projects of NIREH, Bhopal (17 June, 2014) at ICMR Hqts, New Delhi
2. 10th Advisory Committee Meeting on Gas Rahat constituted by Hon'ble Supreme Court (4 July, 2014) at ICMR Hqts, New Delhi
3. CME on Haemovigilance Programme of India (8 August, 2014) organized by National Institute of Biologicals & Indian Pharmacopoeia Commission, MOH & FW, GOI at BMHRC, Bhopal
4. Meeting of the Epidemiological Research Expert Group of NIREH (13 August, 2014) at NIREH, Bhopal
5. Meeting of the Genetics Research Expert Group of NIREH (8 September, 2014) at NIREH, Bhopal
6. Meeting to discuss the issues related to NIREH (29 October, 2014) at ICMR Hqts, New Delhi
7. National Seminar on Medical Issues of gas victims of Bhopal (30 November, 2014) organized by Sambhabna Trust, Bhopal
8. Meeting of Epidemiological Research Expert Group to discuss issues related to ICMR in NGO's representation given to Govt of India regarding revision of death figures in the curative petition (16 January, 2015) at ICMR Hqts., New Delhi

Dr. Sushil Singh, Scientist C

1. Training programme on J Gate Plus (5 June, 2014) at NIOH, Ahmedabad on 5th June, 2014
2. Meeting to review ongoing projects of NIREH, Bhopal (17 June, 2014) at ICMR Hqts, New Delhi
3. CME on Haemovigilance Programme of India (8 August, 2014) organized by National Institute of Biologicals & Indian Pharmacopoeia Commission, MOH & FW, GOI at BMHRC, Bhopal
4. Meeting of the Epidemiological Expert Group of NIREH (13 August, 2014) at NIREH, Bhopal
5. Meeting of Epidemiological Research Expert Group to discuss issues related to ICMR in NGO's representation given to Govt of India regarding revision of death figures in the curative petition (16 January, 2015) at ICMR Hqts., New Delhi
6. Meeting of the Technical Specification Committee of ICMR (18 February, 2015) at ICMR ,New Delhi
7. Workshop on Research Methodology (12-15 March, 2015) at BMHRC, Bhopal

Mrs. Moina Sharma, Scientist B

1. Meeting to review ongoing projects of NIREH, Bhopal (17 June, 2014) at ICMR Hqts, New Delhi
2. Workshop on Research Methodology(12-15 March, 2015) at BMHRC, Bhopal

Dr. Ruma Galgalekar, Scientist B

1. Meeting to review ongoing projects of NIREH, Bhopal (17 June, 2014) at ICMR Hqts, New Delhi

Dr. K.K. Soni, Scientist B

1. Meeting to review ongoing projects of NIREH, Bhopal (17 June, 2014) at ICMR Hqts, New Delhi

Dr. Farida Khan, Consultant (Lab)

1. Meeting to review ongoing projects of NIREH, Bhopal (17 June, 2014) at ICMR Hqts, New Delhi

Dr. R. M. Samarth, Asstt Prof.

1. National Symposium on Green Economy and Harnessing Natural Products for Sustainable Development (12 July, 2014) organized by Department of Zoology, Univesrsity of Rajasthan, Jaipur, India
2. Availed ICMR International Fellowship for Young Biomedical Scientists 2014-2015 at Tokyo Institute of Technology, Japan under Dr. Y. Matsumoto for 6 months (8 Oct 2014 – 7 April, 2015) to work on Role of DNA damage signaling in genomic instability.
3. Seventeenth Symposium on Sensitization of Cancer Treatment (6-7 February, 2015) at Nara, Japan

Mr. S. Subherwal, AAO

1. Meeting of the Technical Specification Committee of ICMR (18 February, 2015) at ICMR , New Delhi

Ms. Anita Pillai, Tech A

1. International Scientific Conference on Environmental Research : Issues, Challenges and Strategies for Sustainable Development and Livelihood Security (1-3 November, 2014) organized by Eurasian Academy of Environmental Sciences at Lumbini, Nepal
2. All India Seminar on Research Directions in Modern Technologies for Sustainable Development (6-7 November, 2014), organized by AISECT University at Bhopal, India

Publications

Research papers in peer reviewed journals

1. Bhat HR, Singh UP, Gahtori P, Ghosh SK, Gogoi K, Prakash A*, Singh RK. Synthesis, docking, *in vitro* and *in vivo* antimalarial activity of hybrid 4-aminoquinoline-1,3,5-triazine derivatives against wild and mutant malaria parasites. *Chem Biol Drug Des* 2014; 84 (6) : DOI: 10.1111/cbdd.12490

2. Bhattacharyya DR, Rajavel AR, Natarajan R, Mohapatra PK, Jambulingam P, Mahanta J, Prakash A*. Faunal richness and the checklist of Indian mosquitoes (Diptera:Culicidae). *Check List* 2014; 10 (6) : 1342-1358

3. Borkatoky BJ, Sarma K, Parida P, Prakash A*, Mohapatra PK, Mahanta J. In Silico sccreening of antifolate based novel inhibitors from *Brucea mollis* Wall. Ex Kurz against quadruple mutant drug resistant PfDHFR. *Com Chem and High T Scr* 2014; 17 (8): 681-693 DOI: 10.2174/13862073176661405211533O5

4. Kemppainen P, Knight CG, Sarma DK, Hlaing T, Prakash A*, Maung YNM, Somboon P, Mahanta J, Walton C. Linkage disequilibrium network analysis (LDna) gives a global view of chromosomal inversions, local adaptation and geographic structure. *Mol Ecol Resour* 01/2015; DOI: 10.1111/1755-0998.12369

5. Kumar M, Sharma K, Rajawat A, Khandelwal S, Samarth RM#. Synthesis and evaluation of antioxidant and radical scavenging activities of quinolinobenzothiazinones. *Res Chem Intermed* 2015 ; 41 (4) : 2265-2276

6. Mohapatra PK, Sarma DK, Prakash A*, Bora K, Ahmed A, Sarma B, Bhattacharyya DR, Goswami BK, Mahanta J. Molecular evidence of increased resistance to antifolate drugs in *Plasmodium falciparum* in north-east India: a signal for potential failure of artemisinin plus sulphadoxine-pyrimethamine combination therapy. *PLOS one* 2014; 9 (9): e-105562.doi: 10.1371/journal.pone.0105562

7. Neafsey DE, Waterhouse RM, Abai MR, Aganezov SS, Alekseyev MA, Allen JE, Amon J, Arca B, Arensburger, Artemov G, Assour LA, Basseri H, Berlin A, Birren, BW, Blandin SA, Brockman AI, Thomas R. Burkot TR, Burt A, Chan CS, Chauve C, Chiu JC, Christensen M, Costantini C, Davidson VLM, Deligianni E, Dottorini T, Dritsou V, Gabriel SB, Guelbeogo WM, Hall AB, Han MV, Hlaing T, Hughes DST, Jenkins AM, Jiang X, Jungreis I, Kakani EG, Kamali M, Kemppainen P, Kennedy RC, Kirmitzoglou IK, Koekemoer LL, Laban N, Langridge N, Lawniczak MKN, Lirakis M, Lobo NF, Lowy E, MacCallum RM, Mao C, Maslen G, Mbogo C, McCarthy J, Michel K, Mitchell SN, Wendy Moore, Murphy KA, Naumenko AN, Nolan T, Novoa EM, O'Loughlin S, Oringanje C, Oshaghi MA, Pakpour N, Papathanos PA, Peery AN, Povelones M, Anil Prakash*, Price DP, Rajaraman A, Reimer LJ, Rinker DC, Rokas A, Russell TL, Sagnon N, Sharakhova MV, Shea T, Simão FA, Simard F, Slotman MA, Somboon P, Stegniy V, Struchiner CJ, Thomas GWC, Tojo M, Topalis P, Tubio JMC, Unger MF, Vontas J, Walton C, Wilding CS, Willis JH, Wu Y, Yan G, Zdobnov EM, Zhou X, Catteruccia F, Christophides GK, Collins FH, Cornman RS, Crisanti A, Donnelly MJ,

Emrich SJ, Fontaine MC, Gelbart W, Hahn MW, Hansen IA, Howell PI, Kafatos FC, Kellis MJ, Lawson D, Louis C, Luckhart S, Muskavitch MAT, Ribeiro JM, Riehle MA, Sharakhov IV, Tu Z, Zwiebel LJ, Besansky NJ. Highly evolvable malaria vectors: The genomes of 16 Anopheles mosquitoes. *Science,* 2015; 347 (6217): 1258522 (DOI: 10.1126/science.1258522)

8. Pathak N, Khan S, Bhargava A, Raghuram GV, Jain D, Panwar H, Samarth RM#, Jain SK, Maudar KK, Mishra DK, Mishra PK. Cancer chemopreventive effects of the Flavonoid-Rich fraction isolated from papaya seeds. *Nutr Cancer* 2014 ; 66 (5) : 857-871

9. Pillai, AS. Impact of the compensation on livelihood of gas affected population in Bhopal, Madhya Pradesh, India. *International Journal of Humanities and Social Science Invention* 2014 ; 3 (6) : 1-4

10. Sharma K, Khandelwal S, Samarth RM#, Kumar M. Natural product-mimetic scaffolds with priviledged heterocyclic systems: Design, systhesis, and evaluation of antioxidant activity of quinzoquinobenzothiazinones. *J Heterocyclic Chem* 2015 (DOI : 10.1002/jhet.2405)

(* Based on the past work of Dr. Anil Prakash, Scientist G at RMRC, Dibrugarh)

(# Based on the past work of Dr. R. M. Samarth)

Research work abstracted/presented

1. A.S. Pillai. *Sustainable development : A mile stone for over all development in reference to environmental protection*. Presented in International Scientific Conference on Environmental Research : Issues, Challenges and Strategies for Sustainable Development and Livelihood Security (1-3 November, 2014) organized by Eurasian Academy of Environmental Sciences at Lumbini, Nepal

2. A.S. Pillai. *Waste management in India: A need of an hour.* Presented in All India Seminar on Research Directions in Modern Technologies for Sustainable Development (6-7 November, 2014), organized by AISECT University at Bhopal, India

3. R.M. Samrth. *Harnessing medicinal plants for radioprotection : with special reference to cytogenetic end points*. Presented in National Symposium on Green Economy & Harnessing Natural Products for Sustainable Development (12 July, 2014), organized by Indian Society for Life Sciences at Jaipur, India

4. R.M. Samarth, M.K. Sharma, S. Imamichi, M. Fukuchi, Y. Matsumoto. *XRCC4 phosphorylation as indicator of DNA-dependent protein kinase functionality in living cells*. Presented in 17th Symposium on Sensitization of Cancer Treatment (6-7 February, 2015) at Nara, Japan

5. N. Gohain, K. Gogoi, A. Prakash*, D. R. Bhattacharyya, N. P. Sharma, C. Dohutia, Chandra, M.C. Kalita. *in vitro antimalarial activity of Litsea salicifolia (Roxburgh ex Nees), an ethno medicinal plant of north-east India.* Presented in First Convention of Ethnopharmacology and National Seminar on Opportunities in Medicinal Plant Research (29-30 November, 2014) held at Jadavpur University, West Bengal

(* Based on the past work of Dr. Anil Prakash, Scientist G at RMRC, Dibrugarh)

Institutional Committees

4th Scientific Advisory Committee

1.	Dr. V. M. Katoch, Secretary DHR & DG, ICMR	Chairperson
2.	Lt. Gen. Dr. D. Raghunath, Jayanagar, Bangalore	Co-chair
3.	Prof. N. K. Mehra, AIIMS, New Delhi	Core Member
4.	Dr. V.K. Vijyan, Kozhikode	Core Member
5.	Dr. S. K. Dave, Ahmedabad	Core Member
6.	Dr. S. E. Hasnain, New Delhi	Core Member
7.	Dr. Padam Singh, New Delhi	Expert Member
8.	Dr. Arvind Pandey, Director, NIMS, New Delhi	Expert Member
9.	Prof. D. K. Behera, PGIMER, Chandigarh	Expert Member
10.	Dr. S. K. Sharma, AIIMS, New Delhi	Expert Member
11.	Dr. Sunita Saxena, Director, NIOP, New Delhi	Expert Member
12.	Dr. Shubha Phadke, SGPGI, Lucknow	Expert Member
13.	Dr. Raj Lakshmi Gope, NIMHANS, Bangalore	Expert Member
14.	Prof. Manoj Pandey, Director, BMHRC, Bhopal	Special Invitee
15.	Mr. K. K. Dubey, Director, Kamla Nehru Hospital	Special Invitee
16.	Mr. Sanjiv Datta, Advisor to DG, ICMR, New Delhi	Special Invitee
17.	Smt. Dharitri Panda, Sr. FA, ICMR, New Delhi	Special Invitee
18.	Mr. T. S. Jawahar, Sr. DDG (Admn), ICMR, New Delhi	Special Invitee
19.	Dr. D. K. Shukla, Head, NCD, ICMR , New Delhi	Special Invitee
20.	Dr. R.C. Sharma, Consultant, ICMR, New Delhi	Special Invitee
21.	Dr. Ravinder Singh, Programme Officer for NIREH, ICMR	Special Invitee
22.	Dr. Anil Prakash, Director I/C, NIREH	Member Secretary

Epidemiologic Research Expert Group

1.	Dr. Padam Singh, New Delhi	Chairperson
2.	Dr. Arvind Pandey, Director, NIMS, New Delhi	Co-chair
3.	Dr. D. C. S. Reddy, Hyderabad	Member
4.	Dr. P. S. S. Sunder Rao, Bangalore	Member
5.	Dr. J. S. Thakur, PGIMER,Chandigarh	Member
6.	Dr. S. N. Dwivedi, AIIMS, New Delhi	Member
7.	Director, National Institute of Epidemiology, Chennai	Member
8.	Director, NIREH, Bhopal	Member
9.	Dr. Sushil Singh, Scientist C, NIREH, Bhopal	Member Secretary

Clinical Research Expert group

1. Prof. D. K. Behera, PGIMER, Chandigarh	Chairperson
2. Dr. S. K. Sharma, AIIMS, New Delhi	Co-chair
3. Prof. R. V. Azad, AIIMS, New Delhi	Member
4. Prof. L. K. Dhaliwal, PGIMER, Chandigarh	Member
5. Prof. Sanjay Agarwal, AIIMS, New Delhi	Member
6. Dr. P. Kulhara, PGIMER, New Delhi	Member
7. Dr. V. K. Vijyan, Kozhikode	Member
8. Director, NIREH, Bhopal	Member
9. Dr. N. Banerjee, Scientist C, NIREH, Bhopal	Member Secretary

Basic Research Expert group

1. Prof. N. K. Mehra, AIIMS, New Delhi	Chairperson
2. Dr. Sunita Saxena, Director, NIOP, New Delhi	Co-chair
3. Dr. (Mrs) S. Chiplunkar, Director, ACTREC, Mumbai	Member
4. Dr. Ravi Mehrotra, Director, ICPO, NOIDA	Member
5. Dr. R. K. Pillai, Rajiv Gandhi Centre for Biotechnology, Kerala	Member
6. Dr. Rameshwaran, ICGEB, New Delhi	Member
7. Dr. Rama Chaudhury, AIIMS, NEW Delhi	Member
8. Director, NIREH, Bhopal	Member Secretary

Genetics Research Expert Group

1. Dr. Shubha Phadke, SGPGI, Lucknow	Chairperson
2. Dr. Raj Lakshmi Gope, NIMHANS, Bangalore	Co-chair
3. Dr. Madhulika Kabra, AIIMS, New Delhi	Member
4. Dr. B. K. Thelma, New Delhi	Member
5. Dr. Gajendra Singh, IMS, BHU, Varanasi	Member
6. Dr. R. Raman, Genetic Centre, BHU, Varanasi	Member
7. Prof. Bidyut Roy, ISI, Kolkata	Member
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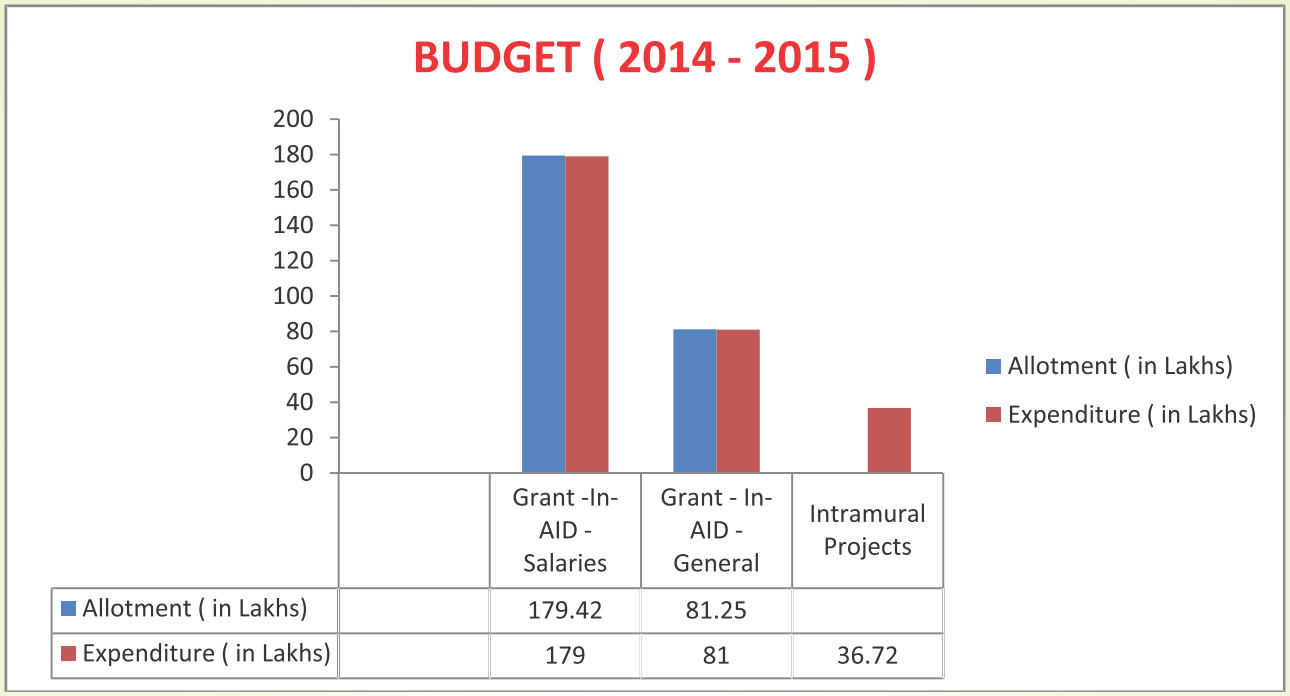

		Grant -In-AID - Salaries	Grant - In-AID - General	Intramural Projects
Allotment (in Lakhs)		179.42	81.25	
Expenditure (in Lakhs)		179	81	36.72

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