National Vector Borne Disease Control Programme:

Joint Monitoring Mission Report, February 2007

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Abbreviations and Acronyms

ABER	Annual Blood Smear Examination Rate
ACD	Active Case Detection
ACT	Artemisinin-based combination therapy
API	Annual Parasite Incidence
AIIMS	All India Institute of Medical Science
AWW	Anganwadi worker
BCC	Behaviour Change Communication
CBO	Community Based Organisation
CHIK	Chikungunya
COMBI	Communications for Behavioural Impact
DDC	Drug Distribution Centre
DDT	Dichloro diphenyl trichloroethane
DEC	Diethylcarbamazine
DHF	Dengue Haemorrhagic Fever
DSS	Dengue Shock Syndrome
EMCP	Enhanced Malaria Control Programme (supported by World Bank)
FTD	Fever Treatment Depot
GoI	Government of India
ICMR	Indian Council of Medical Research
IDR	In-Depth Review
IEC	Information, Education and Communication
IMA	Indian Medical Association
IRS	Indoor Residual Spraying
ITN	Insecticide Treated (bed) Net
JE	Japanese Encephalitis
JMM	Joint Monitoring Mission for review of NVBDCP (2007)
LF	Lymphatic Filariasis
LLIN	Long-Lasting Insecticidal Net
MDA	Mass Drug Administration
MiP	Malaria in Pregnancy

NIMR	National Institute of Malaria Research
NMCP	National Malaria Control Programme
NVBDCP	National Vector Borne Disease Control Programme
MIS	Malaria Indicator Survey
Pf	*Plasmodium falciparum*
PCD	Passive Case Detection
PHC	Primary Health Centre
PPP	Public Private Partnership
PSM	Preventive and Social Medicine
Pv	*Plasmodium vivax*
RDK	Rapid Diagnostic Kit (or test, for malaria)
RPRG	Regional Programme Review Group
SAG	Sodium Antimony Gluconate
SOP	Standard operating procedures
SP	Sulphadoxine-Pyrimethamine
VBD	Vector-borne disease

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0. Executive Summary

0.1. Introduction

The Government of India (GoI) national health policies and programmes have made remarkable achievements since 1951. The GoI strives to ensure that all citizens benefit from the programmes of the Ministry of Health and Family Welfare (MOH&FW). The GoI launched the National Rural Health Mission (NRHM) in April, 2005 that aims to provide affordable and effective health care to all citizens, in particular to the poorer and vulnerable sections of the population through an accountable and reliable health care system in order to achieve the Millennium Development Goals (MDGs) and the goals of the National and State policies stated in the National Health Policy, 2002 and National Population Policy, 2000. Within this context the National Vector Borne Disease Control Programme (NVBDCP) has made good progress in achieving integration and decentralisation of disease control programmes and in reducing the burden of vector borne diseases (VBDs). VBDS particularly malaria, lymphatic filariasis (LF), kala-azar, Japanese Encephalitis (JE), dengue, and Chikungunya (CHIK) are of major public health concern in India. The NVBDCP aims to achieve the following targets: (1) reduce malaria mortality 50% by 2010 compared to 2002; (2) reduce dengue and JE mortality 50% by 2010 compared to 2002; (3) eliminate Kala-azar by 2010; (4) eliminate LF by 2015. The NVBDCP is making remarkable progress towards achieving these targets. However the NVBDCP directorate recognises that there are technical and operational challenges to make further progress and therefore commissioned a joint monitoring mission (JMM) consisting of national and international VBD experts to review the performance, policies and operations of the NVBDCP.

0.2. Review Process

The JMM teams visited six states (Gujarat, Orissa, Kerala, Bihar, Andhra Pradesh and Assam) and Delhi metropolitan from 30 January to 4 February 2007. All teams assessed the policies, performance, and operational aspects of the NVBDCP in general. In addition each team looked in-depth on issues specific to a particular disease control programme - the Gujarat and Orissa teams focussed on the malaria control, the Kerala team on dengue, CHIK and JE control, Delhi team on dengue and malaria control, Bihar team on kala-azar elimination and Andhra Pradesh team on LF elimination. The teams interviewed several key stakeholders in the VBD control from the government organisations, non-governmental agencies, private sector, and the community. The teams reviewed the records of VBDs control programme plans, implementation schedules, supervision checklists, process and output indicators, monitoring and evaluation reports, and epidemic investigation reports. The teams also observed the existing infrastructure and logistics for disease management and vector control. The JMM also reviewed the results of a household and health facilities survey on malaria, dengue, JE, kala-azar and LF control sponsored by the NVBDCP to assess the current situation of the case management, vector control and BCC strategies, and the report on the independent review of the NVBDCP carried out in 2004, and polices and guidelines of the NVBDVP.

0.3. Overall Strengths

There is strong political commitment at all levels to achieve the targets of the NVBDCP. The programme has good guidelines for management and prevention of the six target diseases. The NVBDCP has good scientific support from the ICMR and a competent team of professional staff with dynamic leadership to formulate evidence based policies. The willingness to share all relevant information to evaluate the policies and performance of the NVBDCP and openness to receive constructive comments and recommendations to make the programme more effective are important strengths of the programme.

0.4. Key Findings: Malaria Control

The malaria control programme has made enormous progress in containing the disease since 1976. The strong network of peripheral malaria workers and dedicated malaria programme staff at all levels provides the opportunity to roll out appropriate interventions. Availability of the technical support and evidence base for malaria control from the National Institute of Malaria Research is an opportunity to develop evidence based policies and to evaluate independently the outcomes and impact of the programme.

In spite of having a large surveillance system in place, the true burden of malaria in India is unknown. It is probably much higher than new cases detected through the routine surveillance system because this system does not capture the cases seen in the private sector that accounts for >50% malaria cases. Nevertheless there is a downward trend in the number of reported malaria cases since 1996. However since the number of *P falciparum* cases remains more or less constant the proportion of *P falciparum* among reported malaria cases has been increasing since 1978 and now it is around 45%. The reported malaria deaths remain constant around 1000 per year since 1996 which is probably a gross underestimate of the malaria mortality.

Since 2001, out of 64 drug sensitivity studies using WHO's 28-day protocol conducted in India, only 5 (8%) have shown treatment failure less than 10%; 17 (27%) studies show failure rates between 10-25% and 42(66%) studies show failure rates more than 25%. Furthermore*, s*ince the 1978 the proportion of *P.falciparum* has been increasing and since 1998 *P falciparum* has accounted for around 45% of malaria cases, much higher than that has been observed between 1961 and 1986. This sustained increase in the proportion of *P falciparum* is likely to be due a rising chloroquine treatment failure which leads to selection of drug resistant *P falciparum*. Thus the current policy of offering ACT for P *falciparum* cases only in PHC and/or "Block" PHC areas, where reported chloroquine resistance is >10%, is no longer appropriate and the drug treatment policy should be revised urgently.

More than 50% of fever cases are treated by qualified or unqualified private practitioners and the use of laboratory tests to confirm malaria is rare in the private sector. The use of rapid diagnostic kits to diagnose malaria is very limited in both private and government sector, and the quality assurance system of malaria diagnosis is weak.

The target of annual blood smear examination rate (ABER) 10% is achieved in most areas. However, since the ABER and slide positive rate (SPR) obtained from active case detection (ACD) and passive case detection (PCD) are not differentiated in the analysis the annual parasite incidence (API) derived from the routine surveillance is vulnerable to manipulation. The surveillance data is rarely used at the point of collection and at the district level for treatment decision and also for detecting outbreaks.

The are overlaps in the criteria for deployment of indoor residual spray (IRS) and/or insecticide treated bednets (ITN) and so states and districts are not clear whether to apply both or one of them in areas of intense transmission. The coverage and the quality of IRS are low in most areas. The coverage of ITN varied – high in Assam and close to zero in Chennai and Rajasthan. In Gujarat, application of appropriate vector control strategies based on local evidence and solid scientific support is under development.. However in most other states, there is no stratification of districts according to eco-epidemiological characteristics to deploy appropriate vector control measures.

There are no strategic annual plans with clear objectives, targets, and required inputs to achieve the targets at the district and PHC levels. There are no clear monitoring and evaluation plans to measure process and outcome indicators. The supervision and feedback is weak at all level.

0.5. Key Findings: Dengue, Chikungunya, and Japanese Encephalitis Control

The NVBDCP has developed a long term action plan to contain these diseases and good guidelines on case detection and management of dengue, CHIK and JE. The programme has organised workshops to train trainers on case management and prevention of dengue in all endemic states. The possibility of integrating the surveillance of dengue, CHIK and JE with the existing integrated disease surveillance programme is a good opportunity for early detection of outbreaks.

The training programme on case management and prevention has not reached all relevant medical practitioners particularly in the private sector. Hence, many physicians are not familiar with the standard clinical case definitions for dengue, CHIK and JE and there is no consistent use of standard case definitions by reporting units. The reporting of cases from the private practitioners is *ad hoc*. Furthermore there is no clear strategy for selecting a sample of clinically suspected cases for laboratory confirmation. There is little or no analysis, interpretation and use of the surveillance data at the point of collection and at the district level. At the secondary and tertiary care levels there are no protocols for triage and for handing a sudden increase in cases needing critical care In the event of a major epidemic.

The NVBDCP activities mainly serve the rural areas, but there is little coverage of the urban areas, where a large burden of vector-borne viral diseases and epidemic potential resides. This is in large part due to the fact that the programme only has an advisory role and not a mandate to implement measures in the municipalities and corporations.

Routine entomological data are collected but there is no systematic analysis for decision making purposes, nor is there any oversight of the reliability and accuracy of data. The skills in medical entomology, pesticide management and application methods are inadequate for the needs of a multi-disease programme.

0.6. Key Findings: Kala-azar

The recent shift in policy of the Ministry of Health and Family Welfare towards community health provides an opportunity for implementation of kala-azar elimination programme as a part of the NRHM.

Majority of kala-azar cases (60-70%) access private sector for the diagnosis and treatment. The diagnostic tool, rK39 dipstick is not available in the government sector, while it is available in the private sector, at a variable cost. Patients suspected of kala-azar seen at government health facilities are tested by rK39 through an outsourcing mechanism or by referring to private sector.

The national guidelines for treatment of kala-azar are not strictly followed. Some doctors in the government sector doubt the efficacy of sodium antimony gluconate (SAG) due to treatment failures. However it was noted that some patients had not completed the SAG treatment schedule which could be one of the reasons for treatment failure.

There are delays in diagnosis and treatment and it is related to multiple factors which include poverty, lack of access, high costs and inadequate information about the availability of credible providers in the government and private sectors, and loss of wages during hospitalization. There is no partnership with NGOs for case detection and treatment of kala-azar. Only very few cases of kala-azar are detected through the labour intensive kala-azar fortnight.

Coverage and quality of IRS are low in kala-azar endemic districts. Some DDT on store had either already expired or had no smell of DDT at all. The spraying equipments were inadequate and poorly maintained. There is no vector surveillance, and studies of vector behaviour, bionomics or susceptibility.

The NVBDCP has prepared good training modules on all aspects of the elimination programme. However the JMM team did not find the material at the districts and primary health centres (PHCs). Only a small proportion of the health care providers in the government and private sector has been trained on kala-azar during the last one year Training of the new community based workers ASHA under NRHM does not cover kala-azar.

No district plan for kala-azar elimination has been prepared. Consequently the programme implementation occurs on an *ad hoc* basis. There is shortage of staff at all levels. The lack of smooth flow of funds, dissemination of guidelines, norms and standards, problems in procurement and logistics hamper the implementation of the programme.

0.7. Key Findings: Lymphatic Filariasis Elimination

India is the first country to initiate the programme for elimination of lymphatic filariasis. India went a step further by advancing the elimination target date to 2015. A National Task Force for filariasis elimination has been formed and advisory and technical groups are in place at in most states.

The current national policy that defines the district as the implementing unit for mass drug administration (MDA) is based on WHO recommendations. This is viewed as a major impediment by those implementing MDA because many districts are large and MDA activities need to be carried out even in non-endemic areas within the district. .

MDA activities are planned at the micro level as prescribed by the programme. However, the estimation of drugs for MDA is done by a simple formula of escalating the requirement based on census data and growth projections and not by enumeration as required by the guidelines.

The action plan for moving from a single drug to a two drug MDA and to scaling up the coverage of MDA is not clear. There is also no evidence of planning for activities related to morbidity management. The coverage of MDA is exceptionally high and is possibly due to the use of the estimated target population as the denominator. However the compliance is low in several states.

The programme has made huge efforts to develop its own guidelines and training materials. It has also involved training experts such as medical college faculty members in its training programmes. However, the training on morbidity management was non-existent and health personnel were unaware of the key concepts underlying the strategies for morbidity control.

At current estimates, nearly 1 billion diethylcarbamazine (DEC) and 500 million Albendazole tablets are required every year. In addition drugs for symptomatic treatment need to be sourced and supplied. Currently the procurement process is initiated well in advance but it is generally completed dangerously close to the MDA dates.

The programme lacks adequate space for the storage of DEC and this will be exaggerated when Albendazole is procured for distribution shortly. The programme is also handicapped by the lack of adequate transport facilities for moving staff and materials.

A well defined mechanism is available for monitoring the activities under MDA at all levels. However, in many sites either monitoring was not carried out or done without adhering to the prescribed norms. In many sites the monitoring personnel have not received adequate training on monitoring and evaluation techniques. The resources and tools (for e.g. entomological data) to carry out the prescribed activities are also inadequate. Consequently, many sites are unable to define success or failure of the programme in the absence of baseline data.

The LF programme is currently financed from funds available within the Malaria control programme activities and thus has no budget identity within the NVBDCP. The current budget appears grossly inadequate for the range of activities to be carried out by the programme. The entire funding of the program me has been based on internal resources and no external funding has been either solicited or offered apart from small grants for activities like social mobilization and training by WHO.

0.8. Key Findings: Cross-Cutting Issues

Planning, Monitoring and Evaluation

Annual action plans with clearly defined objectives, targets, monitoring indicators and means of verification of progress are weak at all levels. None of the plans including the 2007-2012 national strategic plans have a clear monitoring and evaluation component. The capacity to analyse, interpret and use data for decision making at the district and

state level is inadequate. There are no standard protocols or checklists for carrying out supportive supervision and to give feedback at all levels.

Integrated Vector Management

The existence of the NVBDCP is a great opportunity for integrating the vector control interventions against disease specific vectors in an integrated vector management framework. However the existing guidelines on vector control are primarily disease specific.

In most states, there is no stratification of districts according to eco-epidemiological characteristics to deploy appropriate vector control measures. There is very little or no NVBDCP vector control activities in the urban areas, where a large burden of vector-borne, viral diseases and epidemic potential resides. The skills and capacity in medical entomology, pesticide management and application methods are inadequate for the needs of a multi-disease programme. The capacity for planning, monitoring and evaluation of integrated vector management involving all stakeholders and community mobilisation needs to be built up at the district level.

There is a lack of clear operational guidelines, procedures and facilities for safe distribution, storage and disposal of public health pesticides. The storage facilities for insecticides and equipments and waste disposal systems are inadequate in most states. Awareness about the International Code of Conduct on the distribution and use of pesticides is very limited among state and district staff.

Behaviour Change Communication

The objectives of BCC strategy are not clearly defined for any of the six target diseases. Despite the availability of a plethora of IEC materials, in most instances they are knowledge oriented. Neither the medium nor the BCC messages had been evaluated for appropriateness or behaviour outcomes. The IEC prototype materials provided by NVBDCP for Kala-azar were not available in some endemic districts. The capacity for developing BCC materials and for implementation varied between states.

Operational Research

There is very good technical support and evidence base for control of VBDs from the relevant research institutes of the ICMR. The existing links between the NVBDCP and the ICMR institutes provide an opportunity for addressing operation research questions. However, research focus of the ICMR institutes need to be oriented more towards the data needed for effective and cost-effective control of VBDs. For example antimalarial drug sensitivity studies are of great help to decide when to change the drug policy but without safety and efficacy trials of alternative antimalarial drugs it is not possible to make an evidence based antimalarial drug policy. Although the NVBDCP carries out operational research periodically, there is no framework or resources for conducting operational research by NVBDCP staff at the state and district levels, and the opportunity for collaboration between medical colleges and the NVBDCP to conduct operational research is not fully exploited.

0. 9. Summary of key policy recommendations

The key new polices amendment to the existing policies are shown in Table 1. The recommendations related to health systems and operational aspects are listed in the relevant disease specific sections of the main report.

Table 1. Summary of Key new and amended policies/strategies

Current policies	New/amended policies	Resource implications
A. Malaria control:		
1. Use ACT [artemisinin + sulphadxoine-pyrimethamnie] as first line treatment for Pf malaria only in clusters of PHC area where reported CQ resistance is >25%.	1. Use ACT as the first line treatment for all confirmed Pf malaria. Introduce this policy in a phased manner to cover nation-wide.	1. Procurement and distribution systems for ACT and RDKs, training and information to public needed for drug policy change, and quality assurance system.
2. Surveillance of malaria is based on PCD and ACD with a target of ABER 10%.	2. Reform the surveillance of malaria by PCD alone – the target should be blood slide or RDK for all suspected malaria cases not a fixed 10%. ACD should be restricted to pockets of problem areas particularly areas with poor access to PCD.	2. Resources for developing and implementing new guidelines on PCD based surveillance.
3. IRS in areas with API >2 identified through ACD and PCD surveillance	3. Introduce micro-stratification of districts based on epidemiological, entomological and environment data for selecting high risk areas for IRS	3. Retrospective analysis of existing epidemiological, entomological and environmental data at the lowest geographic unit possible and building capacity at the district level
4. Free distribution of ITN to economically disadvantaged groups in inaccessible and operationally difficult for IRS with consistently high API	4. Increase the coverage of ITN/LLIN to at least 80% in areas with high API using appropriate delivery systems including free distribution to economically disadvantaged groups	4. Procurement and supply of LLIN, and BCC strategies for demand generation and use of LLIN
5. Monitor the programme through routine surveillance data on SPR and API	5. Introduce a sentinel surveillance system involving both government and private sectors to monitor malaria cases, hospital admission and death attributable to malaria	5. Setting up sentinel health facilities based surveillance systems, and conducting cross sectional health facilities and household surveys periodically

	and periodic surveys of health facilities and households to measure process, outcome and impact indicators	
B. Dengue, Chik & JE		
1. Establish sentinel surveillance sites with laboratory support	1. Introduce a surveillance system based on laboratory confirmation of a defined random sample of suspected cases in sentinel hospitals including private sector	1. One virology lab per region, adequate number of serology labs in each state, training of sentinel surveillance system staff, and running cost of the surveillance system
2. Disseminate an epidemic detection and response guidance to the states	2. Enable districts to prepare and epidemic response plan and to use simulation exercise to validate the robustness of the plan involving all stakeholders	2. Technical support to develop prototype epidemic detection and response plan and simulation exercises for validation and training modules for trainers
3. Determine urban vector ecology and distribution and implement source reduction strategies involving all stakeholders	3. Strengthen urban vector surveillance and control through intersectoral collaboration and public private partnerships and social mobilization methods	3.Sensitisation meetings, training in medical entomology, vector control and programme management training, support for equipments and insecticides to municipalities
C. Kala-azar elimination		
1. Detection and complete treatment of Kala-azar free of charge at government health facilities	1. Extend the detection and complete treatment free of charge to private sector	1. Additional funding for diagnostic kits, drugs, training, information and quality assurance systems
2. Planning, implementation and monitoring of the kala-azar programme as part of all VBDs control within NRHM	2. A vertical planning and monitoring system for kala-azar elimination within the existing integrated VBDs control and NRHM	2. Nodal Kala-azar elimination programme officers at state and district level, staff re-orientation and revising job descriptions of district and PHC level VBDC staff
D. LF elimination		
1. Disability alleviation and prevention implemented though government sector	1. Accelerate disability alleviation and prevention through outsourcing to private and NGO sectors	1. Resources for developing and implementing mechanisms for effective and efficient outsourcing
2. Planning, implementation and monitoring of the LF	2. A vertical planning and monitoring system for LF elimination within the existing	2. Nodal LF elimination programme officers at state and district levels, staff re-

programme as part of all VBDs control within NRHM	integrated VBDs control and NRHM	orientation and revising job descriptions of district and PHC level VBDC staff
E. Cross-cutting issues		
1. ***Planning:*** Annual district and PHC action plans with time-bound targets and activities are not obligatory	1. Introduce annual VBDs control action plans with specific objectives, targets, activities and required inputs at district level and then roll out to PHCs	1. Technical support to build capacity in strategic planning at district and state level
2. ***Monitoring***: Use routine surveillance data on ABER and new cases of malaria to monitor trend	2. Introduce verifiable indicators and means of verification to measure the outcomes of key strategies	2. Technical support to develop objective verifiable indicators, and tools and operational system to measure them
3. ***Integrated Vector Control***: Vector control measures in rural and peri/urban areas focuses on malaria vectors and in urban areas on dengue, malaria, and LF vectors as appropriate	3. Move from a single disease vector control to a multi-disease and multi-sectoral IVM approach wherever applicable and feasible in local situations including use of sound pesticide management practices.	3. Technical support to develop NVBDCP and stakeholders' capacity at all level on IVM planning, implementation and M & Evaluation; support to develop tools and guidelines.
4. ***Behaviour Change Communication***: Use of locally developed disease specific IEC materials mostly knowledge oriented	4.Use of communication for behavioural change (COMBI) in addition to knowledge oriented IEC materials and methods	4. technical support to develop COMBI methodology for VBDs control
5. ***Operational Research****:* research agenda is set mainly by ICMR institutes with little involvement of NVBDCP	5. Promote collaboration for operational research between NVBDCP,ICMR and medical colleges and universities	5. Framework and resource for collaboration between NVBDCP,ICMR and medical colleges and universities

0.10. Conclusions

The NVBDP is doing well in the development of evidence based policies and guidelines for implementing them in spite of the complexity and the diversity of challenges facing this enormous programme. However some policies need updating based on new evidence, implementation experience, and global best practices. Translating policies into action at the district level in a health system that is constrained by limited resources and capacity to plan, implement and monitor is still a challenge. The strong political commitment to control VBDs under the NRHM and good leadership of the NVBDCP

provide a good opportunity to improve the existing strategies and to introduce new policies. In order to take full advantage of this situation, the strategic direction of the NVBDCP should be oriented towards controlling the old and emerging VBDs in the context of the growing economy and the availability of effective new tools and technologies.

1. Background

The Government of India (GoI) national health policies and programmes have made remarkable achievements. The life expectancy has increased from 37 to 65 years and infant mortality rate has decreased from 146/1000 to 70/1000 between 1951 and 2000.[1] Small pox and Guinea worm have been eradicated and polio is on the verge of being eradicated. The five year development plans have a strong component on health and the GoI strives to ensure that all citizens benefit from the programmes of the Ministry of Health and Family Welfare (MOH&FW). The GoI launched the National Rural Health Mission[2] (NRHM) in April, 2005 that aims to provide affordable and effective health care to all citizens, in particular to the poorer and vulnerable sections of the population through an accountable and reliable health care system in order to achieve the Millennium Development Goals (MDGs) and the goals of the National and State policies, including the National Health Policy, 2002 and National Population Policy, 2000. One of the key strategies of the NRHM is 'architectural correction' of the health sector through integration of vertical programs and structures, decentralization of responsibilities and authority, and involvement of Panchayat Raj institutions. Within this context the National Vector Borne Disease Control Programme (NVBDCP) has made remarkable progress in achieving integration and decentralisation of control programmes and in reducing the burden of vector borne diseases (VBDs)

VBDs particularly malaria, lymphatic filariasis (LF), kala-azar, Japanese Encephalitis (JE), dengue, and Chikungunya (CHIK) are of major public health concern in India. The directorate of the NVBDCP is responsible for making policies and technical guidelines, and planning, monitoring and evaluation of the programmes to prevent and control these diseases. The state VBDCP staff are responsible for the implementation, supervision and monitoring of the VBD control programmes. The NVBDCP has set the following targets: (1) reduce malaria mortality 50% by 2010 compared to 2002; (2) reduce dengue and JE mortality 50% by 2010 compared to 2002; (3) eliminate Kala-azar by 2010; (4) eliminate LF by 2015.[3] The NVBDCP employs the following three key strategies to achieve these targets: (1) reduce the disease burden through effective disease management including early case detection and effective treatment, effective care of severe disease though good referral system, and epidemic preparedness and rapid response; (2) reduce transmission risk through integrated vector control including indoor residual spraying of insecticide (IRS) in high risk areas, promotion of insecticide-treated nets (ITN), selective use of larvivorous fish, larvicides, space spraying and appropriate source reduction measures; (3) increase the effective coverage and uptake of prevention and control strategies through behaviour change communication (BCC), Public Private Partnerships (PPP), inter-sectoral convergence, capacity building, operational research, and effective planning, monitoring and evaluation. In addition, the NVBDCP implements mass drug administration (MDA) for elimination of LF and vaccination for control of JE. The NVBDCP has made remarkable progress in reducing the burden of VBDs in India. However the NVBDCP recognises that there are several challenges in achieving the set targets and therefore commissioned the joint monitoring mission (JMM) that included national and international VBD experts to review the performance and the implementation plans and to recommend the steps needed to make progress towards achieving the targets of NVBDCP and the National Health Policy (NHP 2002), and the Millennium Development Goals (MDGs).

2. JMM's Terms of Reference

1. To review the performance of the NVBDCP strategies;
2. To review technical policies;
3. To formulate recommendations in order to move towards achieving the NHP 2002 targets and MDGs by 2015;
4. To assess the sustainability of the activities of NVBDCP to achieve the desired epidemiological impact for VBD control and/or elimination.

3. The Review Process

The director of NVBDCP, Dr P L Joshi briefed the JMM members the situation of malaria, dengue, JE, and CHIK control, and Kala-azar and LF elimination programmes and the objectives and expected outputs of the JMM on 29 Jan 2007. Following the briefing meeting, the JMM was divided into seven teams and each team was assigned to one of the five states (Gujarat, Orissa, Kerala, Bihar, Andhra Pradesh and Assam) and Delhi metropolitan that were pre-selected by the NVBDCP for the review. The field mission was carried out from 30 January to 4 February 2007. All teams assessed the policies, performance, and operational aspects of the strategies of the NVBDCP in general. In addition each team was tasked to look in-depth on issues specific to a particular disease control programme - the Gujarat and Orissa teams focussed on the malaria control, the Kerala team on Dengue, CHIK and JE control, Delhi team on dengue and malaria control, Bihar team on Kala-azar elimination and Andhra team on LF elimination. The composition of the teams and their detailed itinerary is given in Annex 1.

The JMM teams interviewed several key informants (State Health Secretary, Director of Health Services, State VBDCP officers, District Magistrates, Chief District Medical Officer, District Malaria Officer and/or District Vector Borne Disease Control Officer,) in each state. The teams also interviewed several other stakeholders of the VBDCP ie. Medical college faculty members, NGO representatives, Panchayat presidents, Community based health workers & volunteers (Anganwadi workers, Malaria Link Workers, Fever Treatment Depot workers, & ASHAs). The detailed list of Key informants is given in Annex 2. The teams reviewed the available records of VBDC programme plans, implementation schedules, supervision checklists, process and output indicators, monitoring and evaluation reports, and epidemic investigation reports. The teams also observed the existing infrastructure and logistics for disease management and vector control.

The JMM also reviewed the results of a household and health facilities survey on malaria,[4] dengue,[5] JE,[6] Kala-azar[7] and LF[8] control sponsored by the NVBDC to assess the current situation of the case management, vector control and BCC strategies.

4. General strengths of the NVBDCP

The JMM observed that there is strong political commitment at all levels to achieve the aims of the NVBDCP towards reaching the National Health and Millennium Development Goals. The NVBDCP staffs at all levels are very professional and highly motivated. The VBDCP has good guidelines for management and prevention of the six target diseases and these guidelines are available on the NVBDCP's website. There is good scientific support from the relevant research institutes of the Indian Council of Medical Research for developing technically sound policies. The NVBDCP has dynamic leadership and the capacity to formulate evidence based policies. The JMM was given unlimited access to all relevant documents and key stakeholders for this review, which is an expression of

the confidence in the strengths of the current programme and the ability to accept constructive criticisms to make progress towards achieving the objectives of the NVBDCP. The JMM's critical comments and suggestions should be viewed in the current context of enormous economic growth in India, availability of new tools and technologies at reasonable cost, and the need for an effective and efficient VBDCP fit to tackle the old and newly emerging VBDs in the 21st century.

5. Malaria control: impact, outcomes and processes

5.1. Impact indicators

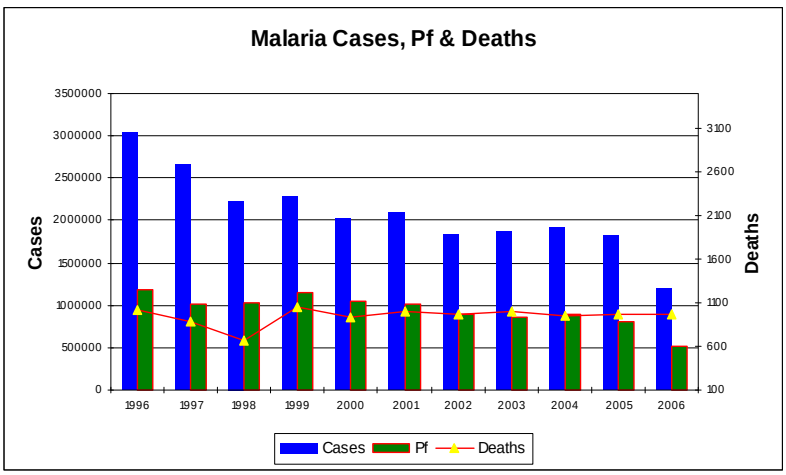
***Malaria morbidity and mortality*:**

There is a downward trend in the number of reported malaria cases (Figure 1). However, the reduction in *P falciparum* cases is relatively smaller than the reduction in *P vivax* and hence the proportion of *P falciparum* among reported malaria cases remains constant around 45%. The reported malaria deaths also remain constant around 1000 per year since 1996. However these data need to be interpreted with caution because of the potential biases inherent in the routine surveillance data. (more on section 6.2.)

5.2. Outcome indicators

There are no set targets for the outputs of the NVBDCP except an annual blood smear examination rate (ABER) of 10%. The current level of selected output indicators observed in the recent household survey by the In-depth Review Team is discussed here in order to set realistic output targets and to monitor progress in the future.

Figure 1: Trend in malaria morbidity and mortality 1996-2006



Source: Country Brief 2006. NVBDCP, Delhi

5.2.1. Early detection and effective treatment:

The NVBDCP has no set targets for proportion of suspected malaria cases tested for malaria using microscopy or rapid diagnostic test kit (RDK) and confirmed malaria cased

receiving an effective antimalarial treatment. The household survey done at the end of transmission season (November/December 2006) in four high endemic districts showed that the blood examination for fever cases was 58% [41% (Orissa) - 83% (Rajasthan) in rural districts and 27% in Chennai city. However the proportion of blood slide results available within a day was only 50% [range 24% (Maharashtra) – 71% (Orissa)]. This means the proportion of fever cases receiving treatment based on the results of blood slide examination was just 29% [range 14% (Maharashtra) – 46% (Rajasthan)]. In Chennai city 80% of blood slide results were available within a day but the proportion of fever cases receiving treatment based on blood results was only 21% because of the low blood slide examination rate.

All Government health facilities available to these populations had only chloroquine, primaquine and sulphadoxine-pyrimethamine reflecting the existing national treatment guidelines. Although the study was conducted at the end of transmission season, among the participant who had fever on the day of survey the slide positive rate was 38% in the rural districts [range 31-42] and it was 4% in Chennai; most of the slide positive cases (91%) were falciparum [range 85% - 100%] in the rural district and 67% in Chennai. Given that chloroquine resistance is high and widespread (more on section 6.1) and the use of blood slide results for treatment decision is low, it is likely that a substantial number of malaria cases is receiving delayed and/or ineffective treatment.

5.2.2. Annual blood smear examination rate and annual parasite incidence

The NVBDCP has set a target of ABER 10% in order to estimate the Annual Parasite Incidence (API). The JMM observed that this target is achieved in most places. However, often the collection of blood slide is to achieve the target of 10% ABER instead of obtaining blood slide results for managing fever cases appropriately. This means often blood slides are collected at the tail end of the annual planning cycle which may or may not be the malaria transmission season. If the blood slide collection is skewed to the low transmission season the SPR will be low and hence the API will be underestimated. On the other hand if the blood slide collection is skewed towards the high transmission season then the SPR will be high and the API will be overestimated. (more on section 6.2)

5.2.3. Indoor residual spraying

The coverage of IRS among targeted houses was 53% [range 35% (Rajasthan) – 91% (Maharashtra). However among the houses that had IRS, only 16% had uniform and complete spray [range 4% (Rajasthan & Maharashtra) – 42% (Assam)]. This means only 9% of targeted houses had uniform and complete spay [range 1% (Rajasthan) – 17% (Assam)].

5.2.4. Insecticide treated nets

The proportion of the population surveyed sleeping under a net (treated or untreated) was 31% in the rural districts [range 1% (Rajasthan) – 88% (Assam)] and 2% in Chennai. The proportion of children sleeping under a net was slightly lower in children <5 years (25%) and slightly higher in pregnancy women (38%) compared to other age groups in the rural districts. The house household survey in Assam involved 6382 individual and a total of 5627 individual reported to have slept under a net on the previous night. The high coverage of nets in Assam is probably due to free distribution of ITNs in the area surveyed. Although it is very encouraging to see high coverage of net in

one state, over all the coverage of net is very low. It is close to zero in Chennai city and in hot areas of Rajasthan. However the comparison of coverage of nets between states should be interpreted with caution because most area with low coverage of net had no free distribution of ITN.

5.3. Input/Process indicators

5.3.1. Availability of antimalarial drugs in health facilities

The first line antimalarial drugs i.e. chloroquine tablets and primaquine were available in ≥ 85% of health facilities (both government and private) in the four states surveyed. In Chennai city only 70% of facilities had primaquine. However, SP the second line drug in areas with chloroquine resistance was low ranging from 7% in Rajasthan to 48% in Assam. All the areas surveyed may not have high chloroquine resistance. Nevertheless the fact that only 35% of the government and private health facilities in Orissa state had SP suggests that even in some high chloroquine resistance areas SP was not readily available

Injection quinine was available in 45% of facilities (range 21-77%) and injection arteether in 40% (range 21-53%) of facilities. Artemisinin, the currently recommended first line drug along with SP was available in 13% (range 0 – 30%) of the facilities.

Although Chloroquine injection is not recommended by the national treatment guidelines for treatment of malaria, it was available in 10.7% (Rajasthan) to 66.7% (Maharashtra) of health facilities. Injection chloroquine can be dangerous in inexperienced hands, and there is no justification for its use, given the widespread chloroquine resistance.

5.3.2. Availability of microscopes and/or rapid diagnostic kits

Sixty seven percent of health facilities had a microscope (range 55% -82%) and 41% had RDKs (range 15-60). However it should be noted that mostly RDK and microscopy were available in the same facilities. This means a substantial proportion of health facilities had neither microscopy nor RDK.

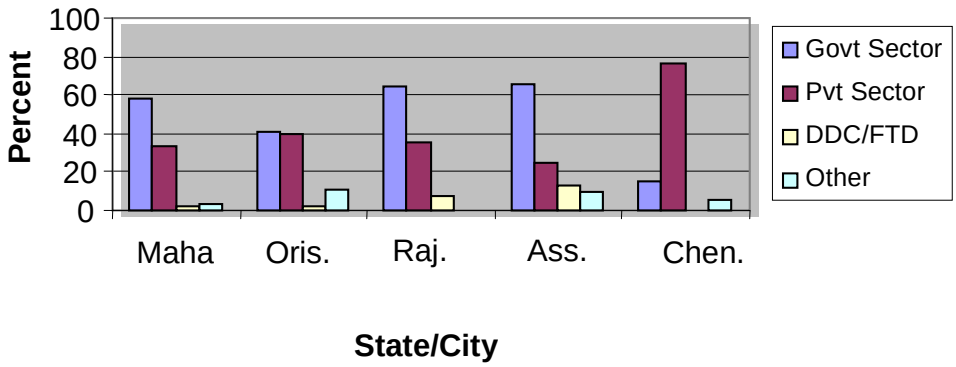
5.3.3. Quality of microscopy

The JMM mission observed that in Gujarat microscopy was done correctly in most health facilities and the results were reported to the patient within 24 - 72 hours. However, a rigorous assessment of a number of malaria laboratories identified that a small proportion of laboratories were reporting very high false negative results. Corrective action for this problem is still to be taken. The JMM Delhi team found that the quality of blood smears was not up to the standard. The thick blood film appeared like thin; malaria clinics lacked satisfactory infrastructure for staining of blood slides and storage of drugs, and disposal of biomedical waste was highly unsatisfactory. In Delhi there was no delay in reporting results at malaria clinics and one day delay in FTDs. Orissa team noted that a large number of blood slides was collected by FTDs (AWW and ANM) and sent for examination to the microscopy centre, but results were never reported back.

5.3.4. Access to effective treatment of fever

In Maharashtra, Rajasthan and Assam, the most common source of treatment for a fever was government health facilities (around two thirds of cases) followed closely by private health facilities (Figure 2). However, in Orissa an equal proportion went to government health facilities as those who went to private facilities/services. Majority of the private service providers were unregistered and inadequately trained (quacks) in Orissa. In Chennai more than three quarters went to private facilities/services.

Figure 2 : Source of treatment for those with fever



Source: Household Survey and Health Facility Survey; In-Depth Review of NVBDCP (Malaria), 2007.

The JMM team noted that in Orissa and Delhi, there was extensive use of CQ for all fever cases. Fever of unknown origin = "malaria", and in practice, presumptive treatment continues to be applied. In Delhi, the follow up of positive cases to ensure complete cure was not up to the mark. In contrast, in Gujarat, in the outpatient facilities observed by the JMM team, malaria case management in the government health services took place in the context of a quality culture, nurtured by good information systems, frequent meetings, and regular supervision. However, the first line treatment remains chloroquine, except in the 4-5 PHC areas, where resistance has been detected, in spite of the fact that all studies in the State in recent years have shown a chloroquine-resistance >25%.

6. Review of key malaria control strategies

6.1. Malaria diagnosis and treatment

Few years ago the first line treatment for *falciparum* malaria was changed from chloroquine to ACT in few districts in the north-eastern States on a pilot scale based on studies indicating very high levels of chloroquine-resistance. The new guidelines (2006) on the treatment of malaria indicate that in PHC areas, where chloroquine-resistance level is >10%, the treatment of *falciparum* malaria should be changed to ACT, and that such a treatment change *may be considered* in a cluster of surrounding PHCs. [3]

A drug policy expert group reviewed the current data on therapeutic efficacy of antimalarial drugs on 5th July, 2006 and concluded, "*Since 2001, 28-day WHO protocol is followed and out of total 64 studies only 5 (8%) have shown failure less than 10%; 17 (27%) studies show failure between 10-25% and 42(66%) studies show failure more than 25%. Thus there is very little evidence of continued efficacy of chloroquine in P falciparum malaria."*[9] It needs to be acknowledged that the resistance rate observed in these studies may be contaminated by reinfections, which may occur in 28 days follow up studies. However, even in situations of intense transmission (typically found only in some forested areas in India), < 50% of day 28 treatment failures may be due to re-infections. Therefore, there is no doubt that in the great majority of sites, where the drug sensitivity test has been carried out, the treatment failure due to resistance is well above 10%. Furthermore chloroquine resistance is wide spread – it is observed in all high malaria endemic regions ie. the north east, central and western regions (Figure 3). It has to be noted that absence of chloroquine resistance in some areas could be due to the fact that rigorous drug resistance studies were not yet done in all areas. The JMM noted that in many low endemic areas such as Kerala the *P falciparum* cases were imported from areas where high levels of chloroquine resistance had been observed.

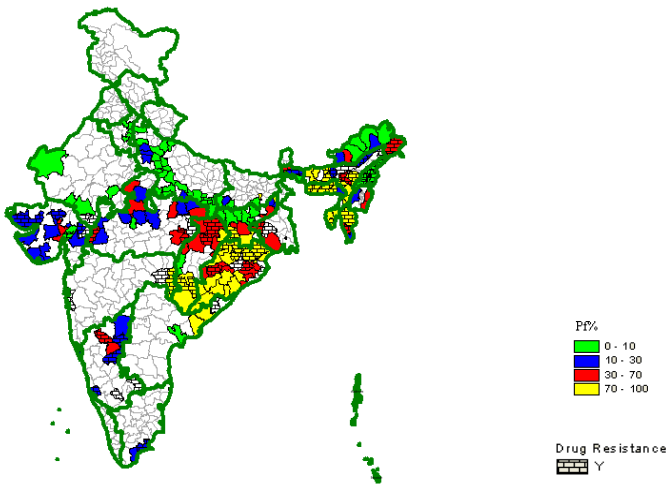
Since 1978 the proportion of *P.falciparum* has been increasing and since 1998 *P falciparum* has accounted for around 45% of malaria cases, much higher than that has been observed between 1961 and 1986 (Figure 4). In other countries in South and Southeast Asia it has been found invariably that increasing percentage of *falciparum* malaria is a sign of resistance, and that this can be reversed by the application of an effective treatment Thus the JMM is convinced that the current policy of offering ACT for P *falciparum* cases only in PHC areas and/or cluster of PHCs, where reported chloroquine resistance is >10%, is no longer appropriate.

Recommendations

1. ACT treatment of *Pf* cases and 14 day primaquine treatment of *Pv* cases should be introduced nationwide as quickly as possible, but according to a prioritized plan including diagnostics, training, quality assurance, supply chain management and information to the public.

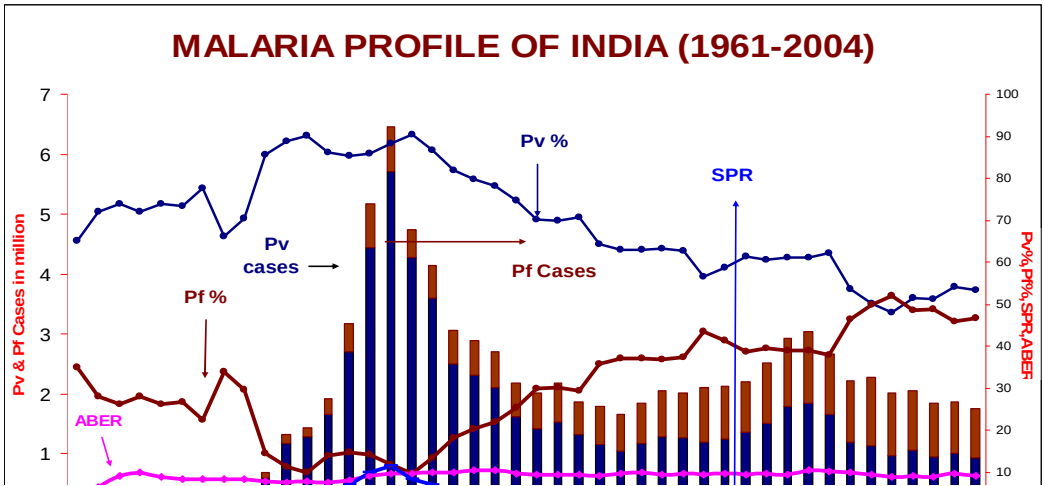
2. The introduction of the new treatment regimen should be presented as an explicit paradigm shift ie. the primary responsibility of malaria control services moves from surveillance to offer effective case management. This means the main purpose of blood slide or RDK examination is to offer effective treatment rather than to estimate API. Thus the output indicator ABER should be replaced by the proportion of fever cases in malaria-endemic areas that is treated according to the new standard treatment regimen. The norm for this indicator should be confirmatory diagnosis by microscopy or RDK within 24 hours and followed by immediate, full and effective treatment for positive cases through public or private services

Figure3. Geographic distribution of chloroquine resistance and proportion of P.falciparum



Source: Presentation to Hon. MoH&FW by the NVBDCP, 05-02-2007

Figure 4:



Source: NVBDCP, Delhi

3. The monitoring of drug resistance should be adapted to the new treatment guidelines. This means that assessment of the therapeutic efficacy of chloroquine for *P falciparum* should be stopped. However the efficacy of chloroquine for treatment of *P vivax* needs to be monitored in selected sentinel sites. More importantly the efficacy of artesunate + SP should be monitored given that SP resistance has already been reported from Assam. In Sontipur, the 14 day clinical and/or parasitological failure rate was 29% for SP in 2001.[10] The NIMR should assess the safety, tolerability and efficacy of other potential ACTs such as artesunate + mefloquine and coartem in order to replace artesuante + SP in the event of high resistance. The cost of drugs is relatively small compared to the costs of diagnostic tests, training and information required for an effective policy change. Therefore safety, tolerability and efficacy of the drug should be the criteria for selecting an appropriate antimalarial combination for treatment of malaria in India.

4. The main challenge in terms of training, logistics and funding for implementing the new treatment policy is confirming malaria diagnosis by blood slide or RDK. In most cases, this will have to be done by an HRP2-based RDK, which has already proven well accepted and practical in peripheral services. However the use of RDK has to be rationalized. Use of RDKs should be prioritized in health facilities where blood slide results cannot be obtained within 24 hours. RDKs should not replace prompt diagnosis by quality microscopy where it is available. RDK should not be used for strengthening ACD instead ACD should be scaled down (more on section 6.2). Based on experiences in the north-east, the national programme must now estimate the commodities, training, supervision and quality assurance needs for each state for introducing ACT. Once a rough State-wise needs estimation has been done by a desk study (finding from IDR-report will be helpful), states and in some cases, districts should be prioritized, with the *Pf* incidence as the main criterion and the level of resistance as a supplementary criterion. The prioritized states should receive full national level support to roll-out the new treatment regimen in the government facilities within one year and in private sector within two years. An implementation plan including clear objectives, targets, timelines, and appropriate process and output indicators for monitoring should be developed for rolling out the new treatment policy nationwide. Funding should be mobilized (as part of the overall programme

funding) to complete the roll-out of the new case management strategy nationwide through public and private sectors within 4 years.

5. Following the introduction of ACTs in the government health system, all private practitioners (including pharmacists, drug vendors and quacks) should be targeted to enable them to follow the national treatment guidelines. A sub-programme with this objective should be designed and adapted to the situations of different states and/or to the urban and rural environment. This sub-programme should make use of the experiences of the other programmes such as TB and Family Planning within India and explore innovative approaches such as “detailing” for better management (Indonesia), “social franchising” of antimalaria treatment (Myanmar), and social marketing (Cambodia).

6. Presumptive treatment for malaria should be discontinued in all settings where a confirmatory diagnosis with microscopy or RDK is available within 24 hours.

7. Microscopy quality assurance should be further enhanced by a regular supervision system based on a protocol such as the one used by NIMR in Kheda district, Gujarat. In states like Orissa, where cross-checking of blood slides is never reported back to microscopists, it should be replaced with annual or biannual competency testing.

8. A system for quality assurance for the use of RDKs should be established. For this technical assistance could be requested from WHO, which has already helped to establish quality assurance systems in the Mekong countries.

9. Flexible solutions should be found for ensuring the permanent presence of microscopists in health facilities, including the integrated training of laboratory technicians covering all important national infectious diseases control programs such as TB and HIV control.

10. FTDs should be discontinued in urban areas like Delhi and the posts may be utilized for surveillance or at clinics. In other areas, their productivity should be assessed case by case. They may be useful in high *falciparum* malaria transmission areas, if they are trained to use and provide with RDKs and ACTs and regular supportive supervision.

11. Antimalarial drugs should be procured only from a limited number of pre-qualified suppliers that are selected at national or state level. It should be checked whether the 3 year shelf-life of Emal (arteether) displayed on the product is based on real-time observations under tropical conditions.

12. RDKs to detect both *Pf* and *Pv* should be considered, as the demand is strong from treatment providers. Immediate diagnosis of *Pv* by RDK would lead to greater patient and provider satisfaction, better diagnosis for fever cases, potentially reduced use of antibiotics and less chloroquine drug pressure. Currently available RDKs for *Pv* are relatively expensive, and the sensitivity is sub-optimal, but an operational research project to ascertain the costs and the benefits of this RDK would be helpful.

13. The referral system should be strengthened, in particular, all severe malaria cases that need referral should be provided free transportation in rural areas.

14. Provision of Rectal Artesunate as immediate start treatment for severe malaria at the FTDs before referring to the next level of care in remote falciparum endemic areas should be considered on a pilot scale with an aim to scale up if shown to be operationally feasible.

6.2. Surveillance

Currently surveillance policy is driven by the target of 10% ABER in all areas irrespective of endemicity, which is inherited from the WHO led global eradication programme. Routine surveillance data from national control programme and data examined during missions at sub-centre level indicate a high degree of compliance with the 10% ABER norm. However, discussions with staff at district and PHC level indicated that in many cases, ACD is applied with the objective of attaining the 10% mark. This is particularly problematic in areas with very low risk areas (e.g. urban), where the surveillance system, as it is, cannot capture information from private services. Furthermore, a surveillance system that allows ACD to achieve an ABER target and does not separate ACD and PCD data is vulnerable to manipulation. Health workers in a given area could easily design data collection to achieve a high API (to get more resources) or a low SPR (to show progress).

IDR-report points out that record-keeping and/or data compilation was a problem at most government and private health facilities. It had been planned to collect data on cases and deaths due to malaria in the preceding 12 month in the IDR health facility survey but these data were either unavailable or very difficult to track at most of the facilities.

The proportion of health facilities that collate and report surveillance data to the next higher level varied from 29% to 63% in the rural districts and 6% in Chennai. This high degree of variation in the functionality of the surveillance system is due to the fact that the analysis included both government and private health facilities. Further analysis of IDR data is needed to understand the effective coverage of health facility based surveillance.

6.2.1. Assessment of malaria burden

The malaria surveillance system reported 1.82 million malaria cases including 0.81 million *P.falciparum* malaria in 2005. However, a WHO report estimated 83 million cases per year.[11] Dr V.P. Sharma estimated around 15 million cases per year (presentation at consultative meeting in 2006 – unpublished). The findings of the IDR suggest that, while malaria is certainly underreported by the surveillance system, the degree of underreporting is not as high as suggested by Korenromp's estimate, which implies that about 10% of the population suffers a malaria attack per year, which seems unlikely. The number of reported malaria deaths has been almost constant around 1000 per year since 1996. However, an unpublished report extrapolating the proportion of deaths due to malaria to total deaths medically certified in 23 states estimated 72,000 - 82,000 malaria deaths for 1998.[12] This estimate could be biased in either direction, but it is based on more robust data than the routinely reported annual figure around 1000.

The IDR survey observed that some PHCs in low API areas seemed to be seeing more fever cases than PHCs in high API areas. This is consistent with what has been observed elsewhere. For example in China, some districts that had a high malaria burden in surveys had reported very few malaria cases during the preceding years. In Asia, there is very often an inverse correlation between malaria burden and strength of health services. On the other hand, a state-wise (and probably also district-wise) malaria map of India, produced by NIMR corresponds well with what is known about ecological determinants of malaria transmission. Thus, it is reasonable to assume that at higher administrative levels (state and district), mapping of malaria surveillance data gives a good impression of the distribution of the burden. Importantly, the lesson from the IDR survey is that API alone is not a sufficient determinant to target vector control at subcentre level. It needs to be interpreted in conjunction with other indicators of burden of malaria.

6.2.2. Assessment of trends

The assessment of trends in malaria morbidity by the current surveillance system appears to be reasonably credible. The report on the implementation of the enhanced malaria control project (EMCP) 1997 – 2005 indicates that very meaningful and informative trends can be observed from surveillance data at macro-level.[13] The EMCP states in the early years of the project reported relatively small decreases in numbers of cases, as would be expected, as delivery improved. In later years, they reported a marked decrease in all malaria cases, but not so marked for *falciparum* malaria, which could be expected because treatment policy was changed in a few places only. The EMCP implementation completion report suggests that in Gujarat in 2004, there was a 20% increase in malaria cases *due to enhanced surveillance activities in the state*.[13] However, the JMM Gujarat team found that while there had indeed been an increase in the number of cases, this was not due to enhanced surveillance. On the contrary, there had been an epidemic, partially due to inadequate surveillance. This discrepancy needs to be investigated rigorously. The ECMP report indicates also a remarkable reduction in the number of deaths during the project period, from 539 in 1997 to 164 in 2005 (up to October). While it is likely that this reduction reflects improvements in some areas or health facilities, it is debatable whether malaria mortality had been reduced by as much as 70% though it would be possible, given that *Pf* cases had been reduced by 65%.

6.2.3. Early warning and detection of epidemics

In most areas, the surveillance system provides data for rapid processing and examination, allowing the early detection of epidemics or impending epidemics. However, there is no definition of an epidemic, no application of threshold indicators recommended by WHO and no systematic format for reporting on epidemics. There is no systematic early warning system for epidemics, despite the accumulation of more than 60 years of data on climatic and social determinants of epidemics in India. Mapping software (GIS) and epidemic warning graphs are not used for Early Warning Systems, except in a few places like Gujarat.

Recommendations

1. Targets, data collection, collation, analysis, and reporting (ABER and SPR) of ACD and PCD should be separated.

2. In malaria endemic areas the target of ABER should be at least 10% but based on PCD alone and the geographic unit for this target should be either PHCs or clusters

of (block) PHCs. This means that the surveillance data are generated by the case management system instead of the surveillance system based on achieving a fixed rate of ABER.

3. The ACD based surveillance system should be rationalised using strict criteria and guidelines. The criteria for using ACD should include the following in addition to other locally appropriate criterion: (a) known high ecological risk areas (eg. areas adjacent to forests) with inadequate PCD reporting of cases; (b) high malaria risk areas with weak health services; (c) Suspicion of an epidemic eg. rumours.

4. A robust reporting system to collect data on hospital admissions, severe malaria and deaths due to malaria in government and private hospitals should be established. This system should be piloted for a year in selected sentinel districts representing high and low endemicity in the five ecological zones identified by the IDR (ie. forest, desert, tribal, plains, and urban) before rolling out nationally. This surveillance should use the IDSP infrastructure. The first step is to break down the weekly monitoring of institutional deaths by age groups and causes of death. The Ahmedabad city's experience in establishing a government and private hospitals based malaria surveillance system should be utilised for developing tools and procedures required for this system. The surveillance of severe malaria, hospitalisation, and death is labour intensive. However these data are extremely important because (a) mortality data have more influence than morbidity data on political decision-makers; (b) hospital data will be useful to assess the plausibility of the morbidity data obtained from the routine surveillance system. For example, independent observers would probably not have believed the remarkable reductions of malaria incidence in Viet Nam in the 1990s, had these not been paralleled by trends in the incidence of severe malaria and malaria deaths

5. Periodic cross-sectional surveys (once in 3 years) of representative samples of households and health facilities should be conducted to assess the actual burden of malaria and to cross-validate surveillance data and trends. The surveys should estimate at least prevalence of fever, prevalence of parasite, fever diagnosis and treatment, fever treatment seeking practices, use of mosquito nets/ITNs/LLINs and coverage of IRS (including replastering). The surveys should become a tool for epidemiological assessment as well as for monitoring outcomes of the programme. The 2006 IDR data should be used as a baseline for repeat surveys at the same time of year (in fact, parasite rates at the end of the transmission season may be less influenced by climatic factors than at the height of transmission).

6. Guidelines should be established on screening of migrant groups, coming from areas considered malaria-endemic to areas, where malaria is not transmitted. This should be part of guidelines for all health workers in such areas, about criteria for blood examination for malaria. There should be no target for ABER in such areas, which include most urban areas in India.

7. For epidemic early warning, intersectoral collaboration that is already established (at least in some places) should be strengthened, so that surveillance activities can be reinforced near development projects, when there is an increased risk. In particular in low-endemic areas, case based surveillance (line-listing) should be promoted.

8. Epidemiological data should be analyzed and used for early detection signals with reference to threshold values as recommended by WHO. With close collaboration with IDSP (Gujarat model) epidemic detection systems should be developed for epidemic prone areas.

6.3 Vector control and personal protection

6.3.1. Indoor Residual Spraying

The NVBDCP's policy is to use IRS selectively in high risk areas (API >2) identified through surveillance. Although the guidelines on IRS are good and precise, they are not applied consistently in practice. Even in Gujarat where there is good technical support from the NIMR most field supervisors did not know the NVBDCP guidelines on IRS. The criteria for use are sensible, but insufficient in that it is not clear what should be done, when in a particular area, transmission and API have been reduced. The criterion for epidemic situations is not clear. "Drug resistant focus" for IRS is no longer relevant since chloroquine resistance is very widespread, but could become relevant in the future if ACT resistance emerges. The guidelines do not cover satisfactorily insecticide management and use of protective gear. India is probably the only country in the world still using the stirrup pump for IRS. This is likely to be one of the factors leading to the low quality of spraying observed by the IDR and the JMM team.

The use of data from insecticide testing for decision-making seems to be the exception for the simple reason that many states do not have entomologists to do the testing. While some states like Jharkhand have no data and therefore insist in using DDT, others stopped using DDT 10 years ago on the basis of susceptibility tests and could consider the reintroduction of DDT in a rotation scheme.

In 1995, the cost of IRS with synthetic pyrethroids was 4 times higher than that of spraying DDT.[16] By 2005, the price of synthetic pyrethroids has declined more than 80% while the price of DDT and malathion did not reduce correspondingly. Thus in 2005, the cost of IRS using DDT was nearly thrice and that of malathion was six times than the cost of spraying synthetic pyrethroids. The availability of cheaper synthetic pyrethroids gives the option of rotating different class of effective insecticides for IRS. However, since pyrethorids is the only class of insecticides that is recommended for treating nets it should be used judiciously for IRS

6.3.2. Insecticide-treated nets

NVBDCP criteria for selection of villages for prioritization include the following: (a) consistently high API, high proportion of Pf, and/or death; (b) inaccessible; (c) limited public transport; (d) operationally difficult for IRS; (e) socio-economically disadvantaged. It also stipulates that free ITN distribution for families below the poverty line (BPL). However, no target for the coverage of ITN is set. In practice, ITNs sometimes becomes something to be handed out to BPL groups rather than a vector control method.

The JMM Gujarat mission noted that the guidelines on the distribution and use of Long Lasting insecticide-treated Nets (LLIN) were yet to be cleared by the Central Insecticides Board (CIB). Since LLINs are treated with permethrin or deltamethrin (both already registered in India) it is likely that the CIB approval is forthcoming, but until then, it is difficult for Government authorities to implement LLINs on a large scale.

In Orissa, the IDR report and the JMM team had similar observations: ITN distribution is sporadic, re-treatment irregular, use of nets variable; in some regions people had no bed nets and in other regions people didn't use them, because they slept outdoors or the regions were too hot; sometimes, in tribal regions people used bed nets for fishing or covering animals.

The distribution and promotion of bed nets is not a strategy in Rajasthan and in Chennai city. The ownership and use of mosquito bed nets was remarkably high in Assam (88.2 %). In Gujarat, users are given clear guidelines on their use and re-treatment. However, no systematic monitoring and evaluation are conducted on actual use or on feedback from users.

6.3.3. Larval control

NVBDCP recommends using larvivorous fish in wells in rural and peri-urban areas, freshwater bodies in rural areas and on rice fields. The application is widespread in Gujarat, but patchy in other places. Gujarat state has made tremendous progress on scaling up the production and use of *Gambusia* and *Poecilia* fish in rural and urban ponds. There has been documentation of the impact of such larvivorous fish in Ahmedabad city and the arid areas in the north of the State. Recent research results generated by NIMR field stations need to be translated to evidence-based guidelines, so that larvivorous fish can be applied with high coverage in areas where it is cost-effective, and it can be avoided to waste resources on this method in ecological conditions, where it is not likely to contribute much to malaria control.

Chemical larval control is used in urban settings in Gujarat for control of malaria and dengue. In peri-domestic sources, Fenthion is widely used, while the Temephos is preferred in intra-domestic use where people tend to store water in containers around the household. Several other measures have been tried but are not used on a large scale (i.e. *Bacillus thuringiensis israelensis*, Juvenile hormones and other IGRs).

6.3.4 Environmental management

NVBDCP recommends use of environmental management of mosquito vectors in urban areas. There is need to fully exploit the potential of this method in urban, industrial and project development and port areas. Judicious use of legislation- on the lines of Mumbai and Surat cities- could be helpful in implementing these measures.

6.3.5 Summary of issues in vector control

It is likely that better coverage with malaria vector control in some areas have contributed to a reduction of the malaria burden. However the JMM's review of reports, guidelines and field observations suggest that:

- There are overlaps in the guidelines for deployment of IRS and ITN and this has lead to states and districts unsure of whether to apply both or one of them in areas of high transmission.
- The coverage and quality of implementation of ITNs are low leading to wastage of resources

- In some areas, like Gujarat, a differentiated application of vector control strategies based on local evidence and solid scientific support is under development. However in most areas there is no stratification according to eco-epidemiological characteristics for deployment of IRS or ITN. For example areas with extremely high temperatures in the peak transmission season may be unsuitable for ITNs. Similarly areas, where malaria occurs only among forest-workers who are exposed to malaria in the forest, are unsuitable for IRS and probably for ITNs too.
- The BCC messages to the population suggesting that ITN is a method for protecting pregnant women and children, may be counter-productive in most areas of India, where everyone is at risk.
- Vector control is primarily single disease specific with little involvement of other stakeholders. There is no functional system in place for health impact assessment in development projects to measure environmental receptivity and community vulnerability and incorporate health safeguards.
- Management of safe handling, transportation, storage and use of insecticides meant for IRS is weak leading to occupational exposures.

Recommendations

1. The NVDCP should convene a Technical Advisory Committee to refine the guidelines on what malaria vector control intervention should be used where and when. Very hot areas like Rajasthan may be unsuitable for ITNs, so IRS and larval control need to be properly organized. It appears that in most other ecological situations, ITNs have very good potential, but it needs to be examined.

2. The concept of micro-stratification should be (re-) introduced for integrated vector management. Using the years of local surveillance data and vector control experience, district staff should be trained in identification and mapping of risk areas and risk population as a basis for planning of vector control. With increasing resources, the “fire-fighting” paradigm must be replaced by a “protect the populations at high risk” paradigm. In each district a well trained and supported VBDC officer should be made responsible for this delimitation of target populations for the different interventions. This stratification must be flexible, but firm enough to provide the corner-stone for planning, monitoring and evaluation.

3. If health authorities identify areas where ITNs are not accepted, they must work with the community to obtain their cooperation for ITNs or IRS.

4. In forest-fringe malaria areas, local rapid assessment for stratification should be carried out and avoid covering with IRS in villages which have many people returning from forests with parasites but no transmission (as usually witnessed by no malaria in young children).

5. The guidelines for ITN/LLIN implementation should define the target populations and time-bound coverage targets (always towards 80%) and different modes of implementation including distribution systems in different socio-economic contexts. The norm for LLINs must be defined as 2 or 2.5 persons per net or 2 nets per family. Like for IRS, the population unit for implementation should be 5000.

6. Monitoring of ITN/LLIN programmes should be not only by coverage surveys, but also by quantity delivered to the target population to fill the delivery gap (output, cf.

WHO draft guidelines). Large scale implementation should be supported by analysis of logistics needs, especially for storage.

7. Public awareness campaigns should promote the correct use of ITNs and LLINs by all age-groups (not only pregnant women and children) and monitor actual use and user satisfaction (or lack of) of ITNs

8. A systematic effort is needed to improve the quality of IRS. Supervision should be based on SOPs. Attempts to change people's perception of IRS should be through dialogue and flexible communication methods instead of enforcement.

9. Choice of insecticide for IRS must be based on sensitivity testing in all areas.

10. Use of compression sprayers, possibly knapsack sprayers should be tried out systematically.

11. Timings of IRS (and net re-treatment) must be based on epidemiological and transmission dynamics data.

12. Develop guidelines for health impact assessment of development project related to vector borne diseases

13. Incorporate safe insecticide management practices in all chemical vector control operations.

6.4. Behaviour change communication

The IDR has observed that availability of health education material was almost confined to government facilities, more at malaria clinics (83%) and PHCs (70%) than at government hospitals (48%) and sub-centres (48%). The production of heath education materials had the same pattern. Two thirds of the malaria clinics, PHC and sub-centres said that they carried out community mobilization activities. Gujarat has put in considerable effort to produce high quality IEC material (print, audio as well as video). Strong political commitment for control of VBD is evident with the Minister taking special attention to ensure effective IEC campaigns. Yet, there is a need to develop IEC, which is outcome (behaviour change) rather than activity/product oriented. Generally, field missions found that the IEC approach was unidirectional having passive partnership with community based organizations. Except for the involvement of school children, there was non-significant participation by the communities.

Recommendations

1. IEC activities should aim at behaviour change and community participation. Create a specialist health education officer's post (with social science background**)** at the state and district level to initiate behaviour change through behaviour need assessment, communication and social engineering.

2. The importance of person-to-person messages in curative services should be emphasised as part of the continuous medical education programme if this exists.

3. Develop a comprehensive IEC strategy for VBD control. This requires technical support from specialized agencies (some of the best agencies are in Gujarat) and a working group of program managers, entomologists and media experts. This could be used as a model for state specific IEC strategy development.

4. A curriculum should be developed at national level for district collectors, magistrates and mayors and top health officials on urban hygiene, vector-borne disease control and communicable disease surveillance.

6.5 Adaptation to specific groups and situations

6.5.1. Reducing the burden of malaria in pregnancy (MiP):

The NVBDCP recommends chloroquine chemoprophylaxis in high risk areas with low drug resistance and chloroquine plus proguanil in chloroquine resistant areas. In 2005, the Drug Policy Working Group recommended two doses of (SP) as intermittent preventive treatment (IPT) in high risk areas. [14] However, IPT in pregnancy is not yet adopted as a policy by the NVBDCP.

All the pregnant women surveyed in Orissa and Maharashtra had received chemoprophylaxis through Anganwadi Centres or ANMs. However it is not clear whether they had received proguanil in addition to chloroquine.

Approximately 10 million pregnant women are exposed to malaria each year in India. A recent study in a tertiary care hospital in Jabalpur, showed that 17% (*Pf* 67%; *Pv* 33%) of women with a history of fever or raised temperature at delivery had malaria parasitaemia.[15] These data suggest that MiP is a significant public health problem in India. However, such hospital based data from symptomatic pregnant women are not reliable for assessing the magnitude of the burden of MiP as these estimates are influenced by the level and pattern of utilisation of health services. There are no robust estimates of malaria infection during pregnancy and its consequences in India that are needed for making informed decision on appropriate control measures. The JMM observed that the treatment offered to MiP varied between facilities and some practitioners are using arteether injections to treat MiP. It is possible that many pregnant women are exposed to artemisinins in the first trimester.

Recommendations

1. Training of fever treatment providers should include a specific module on treatment of MiP and attention should be given to rapidly informing fever treatment providers about correct treatment for MiP and the need to avoid artemisinin derivatives including arteether in the first trimester, unless they need to be given to save the woman's life.

2. Burden of MiP in high and medium risk areas should be studied. The safety and efficacy of potential ACTs for treatment of MiP should be studied and national treatment guidelines for MiP should be developed based on local evidence. Since chloroquine resistance is widespread alternative interventions for prevention of MiP such as IPT with a long acting antimalarial drug or LLIN or combinations of LLIN and IPT should be studied in different epidemiological settings.

3. Since many pregnant women are presumably exposed to arteminsinins already a follow-up study to assess the pregnancy outcomes in these women should be considered.

6.5.2. Urban malaria control

The section deals only with vector control in urban areas, as surveillance and case management have been dealt with above. The NVBDCP criteria for selection of towns for Urban Malaria Scheme include both epidemiological conditions and appropriate interventions. It would seem that urban transmission (occurrence of locally transmitted cases) would be sufficient to qualify for urban malaria scheme. Practically all cities in India are at risk of dengue. Since the larval control measures are required for both dengue and malaria, and now chikungunya as well, the need for a specific urban malaria vector control scheme is debatable. The JMM's view is that the urban vector control should not be disease specific and should be introduced in all cities.

Gujarat focuses on larval control as a primary measure to reduce vector pressure and relies on fogging in the case of disease outbreaks in urban areas. Most of the problem of mosquito breeding in Delhi and Ahmedabad was related to shortage of water supply and unauthorized colonies. Entomological unit in most of the zones in Delhi was not functional. Not a single Insect collector was posted at zonal offices of MCD/NDMC. This contrasted with the much better situation in Ahmedabad.

Most of the efforts of the Delhi Municipal Corporation are directed towards control of nuisance mosquitoes (Culex species). Though mosquito larvicidal oil is being applied in Delhi in the drains, the community didn't feel any reduction in mosquito population. In slum areas of urban Cuttack, most people prefer pyrethroid coils instead of bed nets. People in Ahmedabad seem very uninterested in ITNs and in Chennai this has not been tried.

Space spraying, popularly known as fogging, with malathion mixed with diesel or natural pyrethrum extract mixed with kerosene oil is recommended for control of dengue epidemic in urban areas. In practice, this method has often been used for routine control of mosquito nuisance on popular public demand or demand by public representatives

It is interesting that so far urban *An. stephensi* has not spread to north-eastern India. Its potential spread to South-East Asia constitutes a potential international health risk of the highest order.

Recommendations

1. It would be better to introduce an urban VBDC scheme instead of the urban malaria scheme.

2. Multi-sectoral co-ordination involving all stakeholders (urban planning boards, urban legislation and management committees, urban development ministries, etc) should be facilitated.

3. The vector control should be targeted on breeding sites of Anopheles and Aedes mosquitoes. Aedes control is primarily focused on water containers and the applicability of this principle to malaria (*An.stephensi*) vectors should be examined.

4. Urban entomological units should be strengthened. There should be one entomologist in each zone.

5. Liaise with companies making Desert Coolers and explore the possibility of designing mosquito proof Desert Coolers.

6. Sensitise urban bye-law makers to the urban VBDs and advocate to include a health component in the urban building bye-laws and to add high the penalty for non-compliance and law enforcement mechanisms to contain urban vectors should be explored*.*

7. The eastward spread of urban *An. stephensi* should be closely monitored. The bionomics of this mosquito should be studied to provide evidence on the potential for its spread towards the more humid environments of South-East Asia.

8. Use of space spraying should be regulated on technical grounds only since excessive space spraying may contribute to environmental pollution.

6.6. Private-public collaboration and social marketing

There are various possibilities for public-private collaboration and partnership in relation to malaria control. The concept of partnership means collaboration between equal partners for mutual benefit. In other words a business contract does not imply a partnership. The NVBDC guidelines on public-private partnership give good and practical guidance on the engagement of NGOs and local governments (*panchayat*). The engagement of private sector and NGOs in the treatment of malaria is already covered in section 6.1. and therefore not included here.

6.6.1. Preventive services

Social marketing of ITNs has many advocates, but few successes. It can have a role, but has sometimes been remarkably inefficient compared to commercial marketing. Experience from most countries indicates that coverage of the most needy populations (highest malaria burden and more or less therefore also poorest) is best achieved by free public distribution. This however does not exclude outsourcing to NGOs. LLINs are often too expensive to be competitive with untreated nets for poor people. Furthermore, there is an imminent risk of counterfeit LLINs appearing soon on the market.

Recommendation

Discourage social marketing of LLINs. LLINs should be seen as a public health good and promoted through free public distribution and/or outsourced to NGOs.

6.6.2. Engaging private companies in malaria control

Malaria control is very important for private companies based in malaria endemic areas to keep effective work force. These companies would and should include a comprehensive malaria control programme in their operations. The NVBDCP's role in such cases needs only to provide technical advice.

Recommendation

Persuade large private companies in malaria endemic areas to introduce and/or strengthen a malaria control programme within the staff health programme.

6.6.3. Research and development

India is the world's leading producer of RDKs for *falciparum* malaria. Indian pharmaceutical industry is in the forefront of development of new ACT like products and the production of generic ACTs. Indian chemical industry is dynamic, and there is no reason why India cannot produce LLINs. In this area, there is huge potential for true public-private partnership. One area could be for example collaboration with RDK producers on *cool chain* logistics and quality assurance. In such arrangements it is obviously important for the Government to maintain its impartialness and not to be heavily involved in production.

Recommendations

Engage the ministry of industry and commerce, pharmaceutical, chemical and textile industries to explore the possibility of producing of LLINs, low cost RDKs and ACTs.

6.7. Monitoring and evaluation

The issues in monitoring and evaluation are touched on under surveillance (section 6.2), and the use of repeat surveys has been identified as an important tool for both monitoring and evaluation. The introduction of new commodities will make it necessary to identify appropriate output indicators to measure the delivery of these commodities. New indicators for the main malaria control interventions are now under development by WHO's Global Malaria Programme. This means that the list of output indicators used by the IDR will need to be updated.

In order to have an effective and efficient malaria control programme in India, evaluation is needed every year in every district. The district managers need to be taught to answer rigorously and critically just two questions: (1) Did the malaria situation in the district change? ; (2) If it did, is there a causal relationship between the implementation of malaria control and the change in malaria burden? The best tool for such analysis is a simple graph showing temporal relationships between the burden of malaria and control programme inputs, and comparisons between sub-districts and between neighbouring districts,.

Recommendations

Update the list of process and outcome indicators measured by the IDR to reflect the new inputs and strategies of the programme. Train district VBD/malaria control officers in conducting rigorous monitoring and evaluation of the programmes using simple epidemiological tools and methods.

6.8. Human resources

About 20-50% of the key posts of block supervisors, assistant malaria inspectors, beldars etc who are required for field work were vacant due to administrative reasons in most states surveyed by the IDR and the JMM. There are also many vacancies of general health services staff critical for effective case management and surveillance, including microscopists. Some states implement the NVBDCP policy of using private laboratory technicians for a fee per unit of service (Rs. 3 per slide) to overcome the shortage of microscopists. Most states and districts need qualified entomologists. The state VBDCP units require technical assistance in emerging areas of integrated vector management, strategic planning based on data and evidence, communication for behaviour change, outsourcing of services and contract management.

Recommendations

1. Efforts should be made to fill up the vacant posts at least in endemic areas. Incentives should be given to professional staff for working in remote areas. The transfer of staff with unsatisfactory performance to remote areas is deplorable and in flagrant contradiction of the NRHM.

2. In municipal corporations, there should be one entomologist for each zone.

3. There should be a clear career path for entomologists. Entomologists working for VBDC in the state should always be part of a team, sharing experiences, updating skills and generating operational research projects.

4. Refresher training to laboratory technicians in handling of microscopes, staining, correct identification of malaria parasite and proper storage of antimalarial drugs should be conducted.

5. In some states, redeployment of insect collectors and other personnel from non-endemic to endemic areas should be considered.

6.9. Operational research

NVBDCP has strong links with, and access to the resources of, NIMR. The field research portfolio of NIMR is sound and useful. However, given the size and variability of the country, the Indian field research effort in malaria is not comparable to that of Thailand and Viet Nam. In principle, every state with a major malaria problem should have an institute with a critical mass of entomologists, epidemiologists and communication specialists. Although there is a good link between NIMR and NVBDCP, the input of VBDCP staff in setting research agenda and the utilisation of NIMR's research findings for programme planning is limited.

Recommendation

1. Increase the capacity of NIMR for doing applied research on malaria control. Establish a priority operational research agenda, and a funding mechanism and training in research methods to address the operational research agenda.

2. Involve NVBDCP staff in setting research agenda of NIMR

7. Dengue, Chikungunya and Japanese Encephalitis Control

The first case of dengue in India was reported from Tamil Nadu in 1956. During an outbreak of dengue in Kolkata in 1963, 30% of cases had haemorrhagic manifestation. All four serotypes of dengue have been isolated in India and now dengue is endemic in 21 states
(Figure 5). Several out breaks have been reported since 1996 and the frequency of epidemics and the case fatality rate appears to be increasing since 2000 (Figure 6).

Outbreaks of Chikungunya have been reported in India since 1963 and now it has become endemic in most dengue endemic states. The recent epidemic in 2006, around 1.4 million suspected cases were reported.

Japanese Encephalitis (JE) has been reported from 11 states and about 330 million people are risk (Figure 8). There was an outbreak of JE in 2005 mainly in Uttar Pradesh (Figure 9).

The main strategies of NVBBCP to control dengue, Chikungunya and JE are (1) disease surveillance and management (case detection and effective treatment, effective referral services, epidemic preparedness and rapid response); (2) integrated vector control; (3) supportive interventions ie. BCC, capacity building, etc that cut across all VBDs control. In addition to these measures, the NVBDCP has introduced JE vaccination in high endemic areas in 2006.

Figure 5:
Geographic distribution of dengue 2006

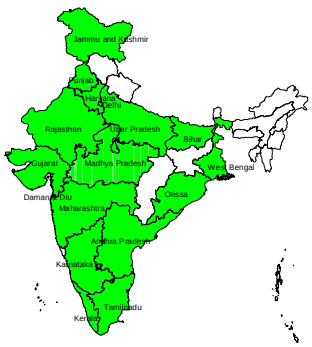
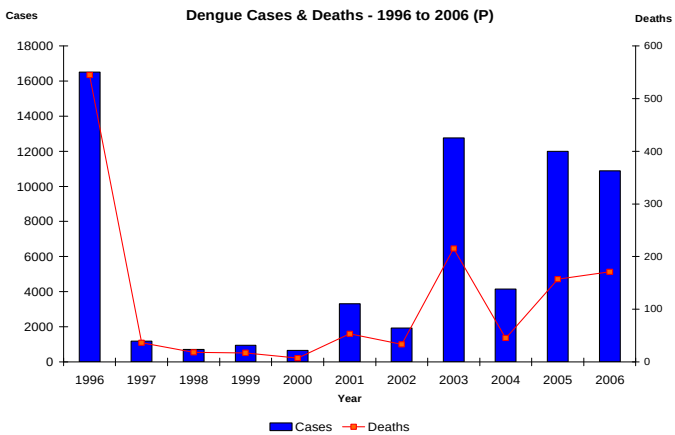
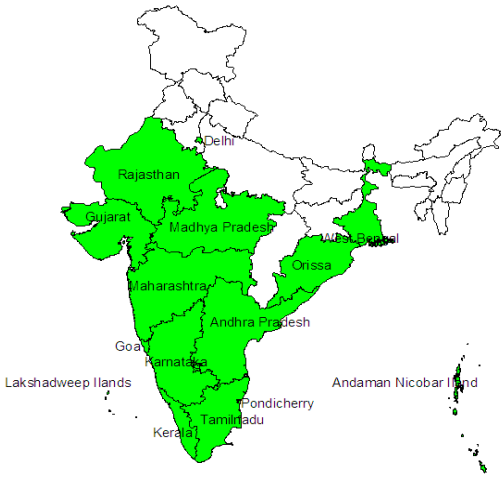


Figure 6:
Suspected cases and deaths due to dengue



Source: Presentation to the Hon. Minister of MOH&FW by NVBDCP Feb 2007

Figure 7: Geographic distribution of chikungunya, 2006



Source: Presentation to the Hon. Minister of MOH&FW by NVBDCP Feb 2007

Figure 8:
Geographic distributions of JE

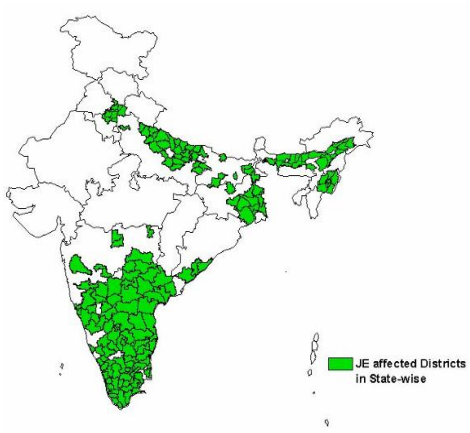
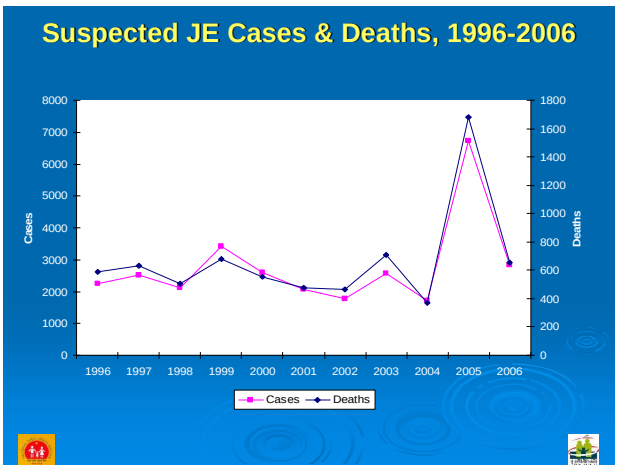


Figure 9: JE trend, 1996-2006



Source: Presentation to the Hon. Minister of MOH&FW by NVBDCP Feb 2007

7.1. Case detection and management

The NVBDCP guidelines on case detection and management of dengue, CHIK and JE are good. However the JMM observed that a syndromic approach to the diagnosis and treatment of fever cases is practiced, but not all physicians were familiar with the standard clinical case definitions for dengue, CHIK and JE. There is no clear sampling strategy for laboratory confirmation of clinically suspected cases. At the secondary and tertiary care levels there are no standard treatment protocols for dengue haemorrhagic fever (DHF), dengue shock syndrome (DSS) and JE. In the event of a major epidemic there is no guidance for triage, nor standard operating practices for handing a sudden increase in cases needing critical care.

Recommendations

1. Train all medical practitioners, both in the public and private sectors in the management and reporting of clinical cases to the district health authorities.

2. Develop a sampling strategy for the laboratory confirmation of clinically suspected cases from designated sentinel surveillance hospitals and disseminate timely and regular feedback reports to all health care units.

3. Adapt the NVBDCP protocols for the management of DF, DHF, DSS, CHIK and JE for different levels of the health care system and make them readily accessible to clinicians.

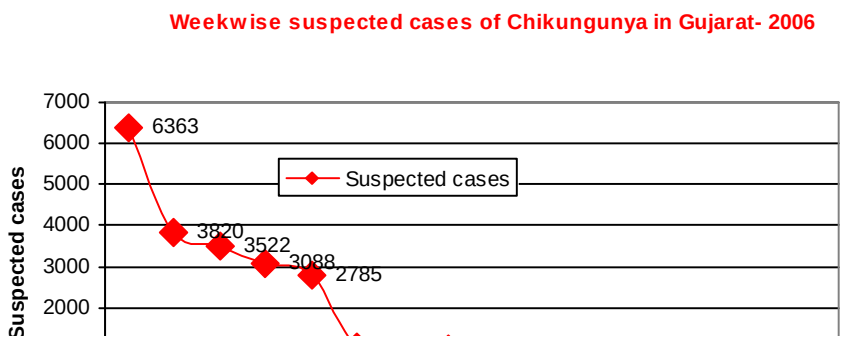
4. Develop a contingency plan for hospitalization during epidemics for which admission of large numbers of patients may be anticipated.

7.2. Surveillance and epidemic response

There is no consistent use of standard clinical case definitions by reporting units, and the reporting of cases from the private practitioners is *ad hoc*. There is little or no analysis, interpretation and use of the surveillance data at the point of collection and at the district level. There is a lack of feedback from state to district to PHC levels. Delays in confirmation of suspected cases largely preclude the early detection of incipient outbreaks. The epidemic graph of the recent Chikungunya outbreak in Gujarat (Figure 10) illustrates this point – the occurrence of this epidemic was noted when it had probably peaked. Although most districts have formed a rapid response team during the last CHIK epidemic in Kerala, there are no epidemic preparedness and response plans at the district or state level.

The Kerala state Institute of virology is not functional. Gujarat state has established 8 sentinel centres in 8 medical colleges with laboratory diagnostic facilities for dengue.

Figure 10:



Source: NVBDCP, Gujarat

Recommendations

1. Establish adequate number of sentinel surveillance hospitals in each state to collect serum samples from a defined sample of suspected cases of viral infection according to a standard operating procedure.

2. Urgently establish a fully functioning reference laboratory for virology and serology in each region and strengthen the microbiology laboratories of the medical colleges to avoid delays in confirming the aetiological agents.

3. Prepare an epidemic response plan and use simulation exercise methods to ensure its robustness. All relevant stakeholders should be included in the preparation and testing.

7.3. Vector Control

The vector control activities at both district and state levels broadly follow the main principles of integrated vector management (IVM). Whereas the NVBDCP infrastructure and programme activities mainly serve the rural areas of the state, there is very little coverage of the urban areas, where a large burden of vector-borne diseases and epidemic potential reside. This is in large part due to the fact that the programme only has an advisory role and not a mandate to implement measures in the municipalities and corporations.

Routine entomological data are collected but there is no systematic analysis for decision making purposes, nor is there any oversight of the reliability and accuracy of data. The skills in medical entomology, pesticide management and application methods are inadequate for the needs of a multi-disease programme.

Recommendations

1. Improve the surveillance of disease vectors and intensify vector control measures in urban areas.

2. Establish regular monitoring and evaluation measures to enable stratification and strategy adjustments to be made on an epidemiological basis.

3. Provide training to district entomologists/biologists and to the operators of insecticide application equipment on pesticide management to ensure the safe and judicious use of insecticides.

4. Monitor insecticide resistance of target vector species.

5. Ensure that source reduction activities are sustained during inter-epidemic periods, and intensified each year during the season of high transmission risk.

7.4 Urban vector borne disease control

Unlike the rural areas, the management of VBDs in urban areas is not given a high priority by municipal and corporation public health workers. The proliferation of dengue and CHIK vectors in urban areas is favoured, among other factors, by inadequate infrastructure for solid waste management and in some areas by deficiencies in the water supply.

It was evident that the NGOs and Community-based Organisations (CBOs) actively participated in the 2006 CHIK epidemic. However, in the post-epidemic period their attentions were diverted elsewhere.

7.4.1. Recommendations: urban vector borne disease control

1. Find mechanisms to engage the municipalities and corporations more extensively in the control of urban vector control. This may include regular briefings of leaders from relevant sectors and the provision of training to programme managers, town planners, media personnel, industry, etc.

2. The involvement of private medical practitioners in vector-borne disease prevention and control should be encouraged through professional organisations, e.g., IMA.

3. Partnership should be built with NGOs and CBOs for the prevention and control of vector-borne diseases.

7.5. Behaviour change communication

In response to the CHIK epidemic and as part of the effort to encourage extensive community participation in source reduction activities to reduce the vector population, a wide range of information, education and communication (IEC) materials were generated and distributed in the two districts visited by the team. They included posters and pamphlets, banners, and compact discs for broadcasting messages from vehicle mounted loudspeakers. The materials were designed and prepared at state, district and local levels and were of varying quality. Most were strongly knowledge-oriented, and where behavioural messages were included, these were often contradictory or unclear. There was no assessment of their impact.

Recommendations:

1. Incorporate a monitoring and evaluation component into the social mobilization and behaviour change communication activities of the programme in order to provide feedback for programme management purposes. This should be informed by container-specific data on the larval ecology of the vectors to provide focus on the most important container habitats.

2. Include the communications for behavioural impact (COMBI) planning methodology, not least for activities relating to source reduction for vector control. It should be noted that there is expertise and past experience with the COMBI methodology in India.

3. Use the opportunity of the inter-epidemic period (dengue and CHIK) to undertake the necessary formative research, pretesting and improvement of the behaviour change messages, identify the most effective channels of communication and design the necessary materials in preparation for their future use. This task should be seen as a part of the epidemic preparedness and response planning process.

4. Explore the possibility of engaging the Faculty of Social Science, Kerala University, and/or other institutions to assist with the development and evaluation of the communication plans.

7.6. Capacity Building

There is only a small number of training of trainers activities in Infectious Diseases Surveillance Programme (IDSP) and Preventive Social Medicine (PSM) and Internal Medicine faculty members are not included. The training of physicians is restricted to selected PHC physicians. For the community-based health workers and volunteers, there is no specific training in DF/DHF, CHIK and JE epidemic detection.

There are no public health planning and management training programmes for district level managers, and there is frequent transfer of chief district medical officers. Generally, district malaria officers have expertise in malaria but limited skills on the management, prevention and control of other vector-borne diseases of importance in Kerala.

Recommendations

1. Intensify training activities on IDSP, including training of trainers courses at district level and for PSM/internal medicine/paediatrics department staff, and all physicians, including private and alternative medicine practitioners.

2. Train all community-based health workers and volunteers in detecting and reporting clusters of fever syndromes and in the understanding of case definitions of DF, CHIK and JE as well as malaria.

3. Provide public health management training and re-orientation to senior level medical officers at district level, and for the district malaria officers/entomologists for improved vector-borne disease prevention and control.

4. Build capacity for serology in tertiary and secondary level hospitals.

7.7. Planning, Monitoring, Supervision and Management

A very strong culture of microplanning was evident in the visited districts but there is no overall planning cycle. Computerisation of data to facilitate analysis was entirely lacking at the PHC level. The supervisory procedures are largely informal and lack means of verification of supervision and feedback.

Recommendations

1. Develop annual plans of action with clear objectives, targets, and verifiable indices at PHC and district levels.

2. Strengthen the capacity for analysis of data at the PHC and district levels.

7.8. Operational Research

There has not been a critical analysis (epidemiology, natural history, transmission, case management) and review of the response to the 2006 CHIK epidemic, including efficacy and effectiveness of the vector control measures, from which lessons can be learned and improvements made in preparation for future epidemics of CHIK and other arboviral diseases, notably dengue and JE.

Recommendations

1. Orient faculty members to the operational needs of the NVBDCP and strengthen collaboration between the staff of NVBDCP, ICMR and other research institutions.

8. Elimination of kala-azar

Kala-azar is endemic in Bihar, West Bengal, Jharkhand and Uttar Pradesh (Figure 11). The NVBDCP aims to eliminate Kala-azar from India by 2010. The NVBDCP's main strategies to achieve this target include case detection and complete treatment, disease surveillance, vector control and the cross-cutting supportive interventions of VBDs control. The JMM visited Muzzafarpur and Vaishali districts and reviewed the findings of In-Depth Review carried out by RMRI, Patna.

8.1. Kala-azar disease burden

The reported cases of Kala-azar have been declining since 1992 (Figure 12). However the declining trend is reversed since 2002. This apparent increase in the reported case could be due to the increased surveillance, accessibility to appropriate treatment and increased public awareness. However the JMM estimated that there is about 10 fold underreporting of kala-azar cases. There are pockets of high burden, particularly among socio-economically disadvantaged populations. Within such a pocket the JMM team came across multiple cases within a single family and also repeated episodes in high risk individuals (one individual had suffered from kala-azar twice during the last two years).

8.2 Case detection and complete treatment

The JMM team's observation and the IDR indicate that about 60-70% of kala-azar cases access private sector for the diagnosis and treatment. Frequently there is an overlap between private sector and the government sector in utilization of diagnostic and therapeutic services. rK39 dipstick is not available in the government sector, while it is available in the private sector, at a variable cost. Patients suspected of kala-azar seen at government health facilities are tested by rK39 through an outsourcing mechanism or by referring to private sector. This is contributing to the movement of patients from the government to the private sector. Majority of the patients are currently accessing the private sector for diagnosis by rK39.

Figure 11: Kala-azar endemic areas

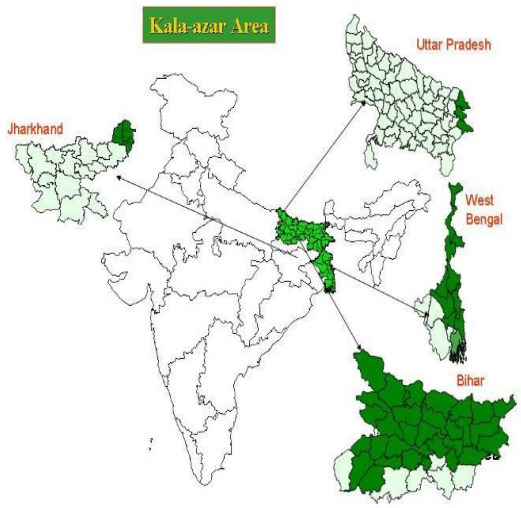
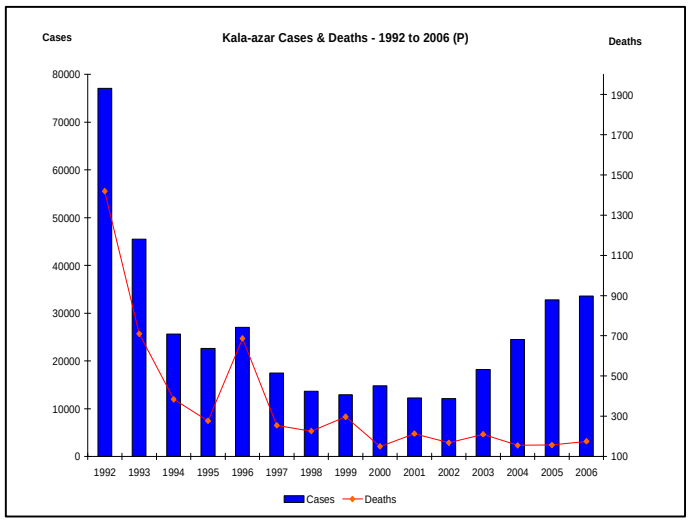


Figure 12: Kala-azar cases and deaths



Source: Country Brief 2006. NVBDCP, Delhi

During the JMM's visit, SAG was available in the government sector up to the PHC level. However many delivery points of SAG frequently run out of supplies due to the complexity of the procedures of procurement and to insufficient planning. This leads to disruption of treatment and change of treatment provider or discontinuation of treatment. The most peripheral point of delivery of SAG is the Block PHC. Sometimes vials of SAG are provided to the PHCs or subcentres for supplying to patients but the JMM did not see any system to monitor whether the medicine is supplied to the patient correctly. Individual patient treatment boxes are not maintained. This increases the risk of the supplies running out and, for the patient, the risk of change in treatment.

The IDR and the JMM team noted that the national guidelines for treatment of kala-azar are not strictly followed. Some doctors in the government sector questioned the efficacy of SAG due to treatment failures, but the JMM team noted that some patients had discontinued SAG before completing the treatment schedule. Thus, the reasons for treatment failure are unclear. At the district hospitals Fungizone is widely used because

of perceived lack of efficacy of SAG or often without any reason. Patients were often switched to Fungizone within 15 days of treatment with SAG.

The JMM team observed that the old kala-azar treatment cards are still in use instead of the new cards. The treatment cards are often not completed or incomplete. The patients seen by the JMM did not have any treatment card. They had only sketchy treatment records given by private practitioners.

The JMM observed that there are delays in diagnosis and treatment and it is related to multiple factors which include poverty, lack of access, high costs and inadequate information about the availability of credible providers (in the government and private sector), and loss of wages during hospitalization. The delay in seeking treatment, increases the severity of the disease as well as prolongs the transmission.

Hardly any kala-azar patient had received the treatment totally free. The patients had to pay for the rK39 test, syringes, needles, injections, and transportation. In the private sector the patients have to pay for the anti Kala-azar drugs as well. In addition they lose wages for at least 1 month. The families interviewed by the JMM team reported that they spent about Rs 7000-10,000 for the diagnosis and treatment of kala-azar and that they had to raise loans at prohibitively high interest rates or to sell their meagre assets to defray the expenses.

There is no partnership with NGOs for case detection and treatment of kala-azar because it is argued that NGOs lack capacity and are not interested in working on kala-azar.

Recommendation

1.Diagnosis and treatment of kala-azar should be offered free of cost at the point of delivery in the government and private sectors. Additional incentives to assist kala-azar patients to mitigate the loss of income during kala-azar treatment should be explored.

2.The programme should ensure practice of uniform standards in the public and private sector through training, effective dissemination of national treatment guidelines and establishing working PPPs

3. The exiting effective and new tools (e.g. rK39, miltefosine, paromomycin etc) should be introduced and an action plan to achieve a high coverage of these tools (target set by the NVBDCP) should be developed and implemented.

8.3. Surveillance and reporting

The reporting of kala-azar is based on passive case detection supplemented by additional case finding during the kala-azar fortnight. During the Kala-azar fortnight kala-azar cases will be identified by house to house search and using serology tests. The labour intensive kala-azar fortnight in November 2006 detected very few cases. It had overlapped with EPI campaign and there was no IEC prior to or during the fortnight.

Some districts have started to include the reports from selected private institutions. This carries the risk of double reporting in the absence of a system for identification of patients through line listing and individual patient treatment cards.

The registers and records of kala-azar cases were inadequate and provided sketchy information which was often confusing. Consequently, the reporting and feedback are unsatisfactory.

Recommendation

1.The passive surveillance system should be strengthened through line listing, data management, timely reporting and feedback. This should be supplemented through periodic surveys using IDR 2006 data as the base-line.

8.4. Vector Control

Data from the recent IDR, indicate that the average coverage of IRS is 50% for 1st round and 20% for 2nd round. However uniform and complete IRS coverage was only 7%. The JMM observed that the preparation for IRS was inadequate in Bihar. The microplan at the district/PHC level is yet to be completed for the IRS round due to start within a week and supposed to cover the entire state. No planning has been made for training spray squads. There is no contingency plan to cover if the IRS round overlaps with other mass campaigns such as Polio.

The storage facilities at the Block PHC level was reasonable but the some DDT on store had either already expired had no smell of DDT at all. The spraying equipments were inadequate and poorly maintained. There is no vector surveillance, study on vector behaviour, bionomics or susceptibility. There are no entomologists or insect collectors at the state level in Bihar.

Recommendations

1. Vector control should be planned well ahead of the IRS (at least 3-4 months). In 2008 the plan should be based on regular annual studies on vector behaviour, bionomics and level of susceptibility of the vector. The programme should consider covering hot spots in an intensive manner through focal spraying.

2. The NVBDCP should monitor the quality of insecticide, and equipments used for IRS and assist the states to maintain a standard capacity for implementing, and monitoring coverage and quality of IRS.

8.5. Behaviour Change Communications

The objectives of BCC strategy are not clearly defined. The BCC prototype materials provided by NVBDCP were not available in the states and districts. The capacity for developing BCC materials as well as implementation was inadequate at the state and districts.

Target community was aware of the symptoms and treatment of kala-azar by virtue of personal experience. However they lacked knowledge regarding mode of transmission,

vector control, diagnosis, and the need for complete treatment. The mission did not find any evidence of community sensitization activities**.**

Recommendation

1. A BCC strategy with clearly articulated behaviour objectives should be prepared and implemented with appropriate stress on interpersonal communication besides the widespread use of IEC materials.

8.6. Training and capacity development

The NVBDCP has prepared good training modules on all aspects of the elimination programme. However the JMM team did not find the material at the districts and PHCs.

A 3-day training of doctors on kala-azar elimination programmes was scheduled in the last quarter of 2006 and faculties from 8 medical colleges were responsible for running this course. The JMM could not determine the contents, methods and outputs of this course because there were no records. There has been no training for other categories of staff at any level.

The JMM team noted that training of the new community based workers ASHA under NRHM does not cover kala-azar. It is however proposed to be included in the training materials as well as the training planned during 2007. The IDR points out that only a small proportion of the health care providers in the government and private sector have been trained on kala-azar during the last one year. Majority of the providers interviewed expressed the need for training and capacity development.

Recommendation

1. A clear training schedule using quality material on all aspects of kala-azar elimination for all relevant staff should be developed an implemented. The NBVDCP may need additional technical support for the capacity building programme.

8.7. Programme planning and management

The recent shift in policy of the Ministry of Health and Family Welfare towards community health provides an opportunity for implementation of kala-azar elimination programme as a part of the NRHM. However, the JMM team observed numerous constraints in planning and management at all levels. No district plan for kala-azar elimination has been prepared. Consequently the programme implementation occurs on an *ad hoc* basis. The lack of smooth flow of funds, dissemination of guidelines, norms and standards, problems in procurement and logistics hamper the implementation of the programme. Due to lack of planning and programme management, supportive supervision and feedback for improvement of delivery of health services are not carried out.

Even though regular review of progress in the implementation of kala-azar was included as a part of review of NRHM, there was no systematic review process as defined in the documents.

Recommendations

1. Kala-azar elimination programme should remain an integral part of NRHM. However since this is a time-bound effort, it should have a preferential mandate for employment and re-deployment of staff, resource allocation, command and reporting structure. Kala-azar elimination officers fully dedicated to the kala-azar programme should be deployed at the state and district level and they should be given the responsibility for developing comprehensive district plans including capacity development, procurement of logistics, monitoring and supervision.

2. The current activities of the Kala-azar elimination programme should be implemented in all the endemic districts. However a stepwise approach should be adapted for introduction of additional activities proposed ie. free diagnosis and treatment, active-case detection, use of miltefosin and paromomycin (after approval by National Expert Committee), individual patient treatment cards and treatment boxes, should be introduced first in high burden districts or hot spots within high burden districts. The processes and outcomes of the programme in the high burden districts should be rigorously monitored and then rolled out to rest of the districts based on the lessons learnt.

3. The state health authorities should fill the vacant positions at different levels of the programme, and make necessary staff redeployment to the high burden districts and/or hot spots. Specific job descriptions for each cadre of staff should be developed.

4. Partnerships that are sustainable should be built with the private sector and NGOs since a large proportion of patients affected by kala-azar are attended by these sectors. A mechanism to ensure free diagnosis and treatment in the private sector should be developed (The costs incurred by the private sector can be borne by the public sector through suitable arrangements).

5. Adequate funding and timely disbursement of funds will be a key factor in the timely implementation of kala-azar elimination programme. Mechanisms need to be worked out for this within the structure of NRHM to ensure the availability of funds in a timely manner.

8.8 Operational research

There are several research issues that are important for the success of the elimination programme. These include diagnosis and treatment of post kala-azar dermal leishmaniasis, natural history and consequences of HIV/AIDS kala-azar coinfection, the importance of asymptomatic carriers of kala-azar as a risk factor for transmission, environmental manipulation and management in vector control, drug resistance and insecticide resistance.

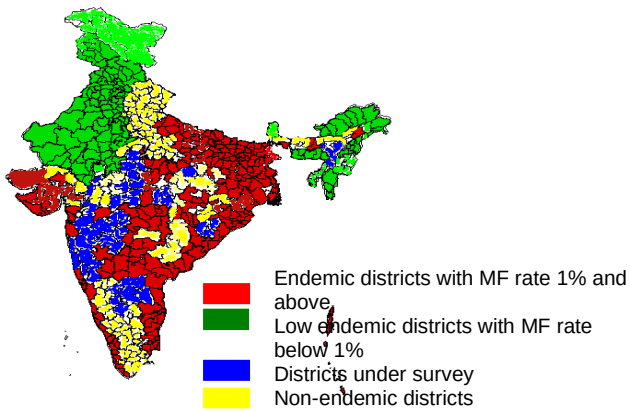
Recommendation

The NVBDCP in collaboration with the relevant ICMR institutes should define an operational research agenda relevant for Kala-azar elimination and seek resources for addressing the research agenda

9. Elimination of Lymphatic Filariasis

India has one of the oldest programmes for LF control and has the distinction of being the first country to initiate the programme for elimination of lymphatic filariasis. It is a signatory to the WHA resolution to eliminate LF by the year 2020. India went a step further by advancing the elimination target date to 2015 (National Health Policy, 2002). The programme's main strategies for elimination of LF are (1) annual mass drug administration (MDA) of single dose of DEC annually for five years or more to eligible population to interrupt transmission; (2) home based management of lymphoedema and scaling up hydrocele operations. These strategies were initiated in 13 districts first on a pilot scale. Then it was rapidly expanded to include 243 districts (20 States/UTs) covering 558 million people making it one of the largest public health programmes in the world (Figure 13). India has completed mapping of endemic regions in the country and has developed its own guidelines for elimination based on the guidelines issued by GPELF. In addition, training materials and BCC kits have been indigenously developed by the programme. Over 2.2 million individuals have been trained and developed to distribute the drugs. The programme, which is currently administered by NVBDCP, has been able to raise funds internally to carry out its activities.

Figure13: Geographic distribution of lymphatic Filariasis



Source: Country Brief 2006. NVBDCP, Delhi

9.1. Planning

A National Task Force for Filariasis elimination has been formed, and advisory and technical groups are in place in most states. MDA activities are being planned at the micro level as prescribed in the programme. However, the estimation of drugs for MDA is done based on a simple formula of escalating the requirement based on census data and growth projections and not by enumeration as required by the guidelines. The

current exercise of determining drug requirement appears to be academic in nature. The JMM could not identify a clear policy for the transition from a single drug MDA to a two drug policy or for the scaling up of the distribution to reach the target of elimination by 2015. There was also no evidence of planning for activities related to morbidity management

Recommendations

1. Appoint centrally supported State and District level nodal officers for effective co-ordination

2. Consider outsourcing and public-private partnership and NGO participation (e.g. former leprosy units) in disability alleviation programmes.

9.2. Advocacy and social mobilization

The team noticed that considerable effort had been made on advocacy and to mobilize communities to participate in the LF elimination programme. There was a plethora of advocacy material produced at several levels based on broad guidelines outlined by the NVBDCP. Despite the surfeit of material in most instances neither the medium nor the messages had been evaluated for appropriateness or behaviour outcomes. In several settings interpersonal communication appeared to convey key messages very effectively.

Recommendation

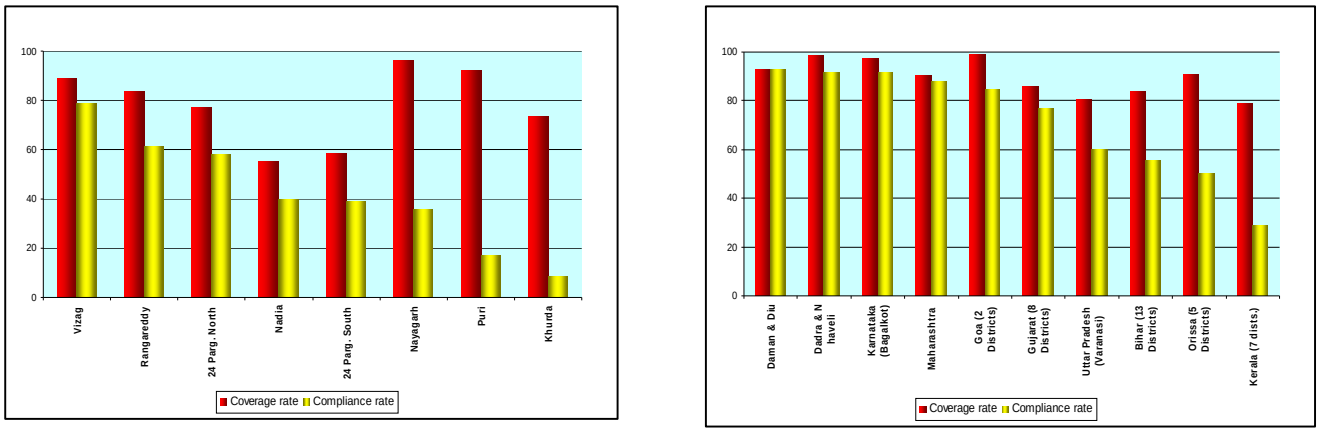
1. Review and redesign BCC involving social marketing experts to develop key messages and involve state level IEC officials in the exercise

9.3. Implementation

The team noted that while the planning process and training activities were fairly well organized the LF programme has major difficulties in its implementation. The current national policy on the size of the implementation unit (districts) for MDA is a major impediment. Since many districts have both endemic and non-endemic areas, several non-endemic pockets are included in the MDA activities. The current recommendations regarding the time and duration of MDA appear to be another major constraint in implementation. The
reported coverage in many areas is exceptionally high and is possibly related to the fact that this is based on calculations that use the target population as the denominator. However the compliance is low in several states (Figure 14). The JMM team also noted in Andhra.

Figure 14. Coverage and compliance of MDA 2004 and 2005

MDA 2004 **MDA 2005**



Source: Country Brief 2006. NVBDCP, Delhi

Pradesh that in actual practice the consumption is extremely low and in particular the consumption and coverage in urban areas is a major cause for concern. The team's view is that there was no ownership of the programme and poor participation of NGO's in all the activities. Finally there does not appear to be clarity about the proposed integration with the NRHM

Recommendations

1. Include new districts only on the basis of surveys with the tools and methods recommended by the NVBDCP. If areas within the district are to be excluded the unit to be excluded should be at least a PHC/Block in rural areas or ward/cluster

of wards which are contiguous without filariasis in consultation with the RPRG of the WHO.

2. Recommend to identify all clinical cases by line listing

3. Maximize consumption of drugs in the MDA programme under supervisory administration (ideally using DOT strategy) and enforce inbuilt and independent assessments of compliance.
4. Harmonize and strengthen vector control measures to protect citizens from all vector borne diseases and ensure coverage of the entire town instead of part of the town/corporation. Explore utilization of resources available under the NRHM for this activity.

9.4. Human Resource Development

The programme has made huge efforts to develop its own guidelines and training materials. It has also involved training experts such as medical college faculty members in its training programmes. The programme should be commended for its efforts to impart training to several thousand people at various levels with meagre resources. Although the NVBDCP has defined the cascade from the national level to the periphery the team noticed that while the programme managers at state and national levels as well as the grassroots workers were familiar with their tasks middle level managers were unable to understand and execute their tasks due to inadequate training opportunities. There was acute shortage of staff and resources at all levels in the programme. The team also noted that while the course content was exhaustive it lacked focus in defining the tasks to be carried out by individuals in MDA campaigns. The team also noted that the training with respect to morbidity management was non-existent in many laces and health personnel were unaware of the key concepts underlying the strategies for morbidity control. Similarly the team noted that vector control activities were being carried out in a ritualistic fashion by persons who were not trained.

Recommendations

1. Recruit or re-deploy to fill all positions and ensure quality training to all identified personnel

2. Accelerate implementation of morbidity management strategy by providing adequate training provision of provider incentives

3. Involve Research Institutes and Universities for addressing key questions in implementation in MDA

9.5. Logistics

The JMM team recognised the magnitude of the task to procure quality drugs, to deliver drugs to endemic populations, and to monitor the activities of the programme. At current estimates nearly 1 billion DEC and 500 million Albendazole tablets are required every year. In addition drugs for symptomatic treatment need to be sourced and supplied. Currently the procurement process is initiated well in advance but it is generally completed dangerously close to the MDA dates. This allows for little time for the distribution of the drugs down the supply chain. The team also noted that the programme

lacks adequate space for the storage of DEC and this will be exaggerated when Albendazole is procured for distribution shortly. The programme is also handicapped by the lack of adequate transport facilities for moving staff and materials.

Recommendations

1. Explore blister packing of co-administered drugs to enhance compliance

2. Strengthen mechanisms to ensure the quality of DEC procured by the programme.

9.6. Monitoring and evaluation

The group noted that a well defined mechanism is available for monitoring the activities under MDA at all levels. The monitoring and evaluation (M&E) is carried out by the programme itself and not by independent observers. However, on the ground the team found that monitoring was not implemented in many sites due to a variety of reasons and wherever it was being done it was grossly inadequate due to non-adherence to prescribed norms. In many sites the concerned individuals had not received adequate training for such M&E activities while at others they had neither the resources nor the tools (for e.g. entomological data) to carry out the prescribed activities. Consequently, many sites were unable to define success or failure in the absence of baseline data. At other sites the lack of clarity regarding the stoppage of MDA is a problem. In the case of morbidity management the lack of well defined indicators for measuring both process and impact was noticed by the team

Recommendation

Provide adequate resources for M&E activities and involve independent agencies like medical colleges, research institutes, and universities in M&E.

9.7. Finance

The LF programme is currently financed out of funds available with the Malaria control programme activities and thus has no budget identity within the NVBDCP. The current budget appears grossly inadequate for the range of activities to be carried out by the programme. The team also noted that the entire funding of the programme has been from the Government of India and no external funding has been solicited or offered.

Recommendations

Consider approaching international agencies for additional funding for the LF elimination programme.

10. Disease cutting-policies/issues

10.1. Stewardship and management on NVBDCP

The existing disease specific programmes have been integrated as the vector borne disease control programme (VBDCP). This is proposed to be implemented as a part of National Rural Health Mission (NRHM) in collaboration with Integrated Disease Surveillance Programme (IDSP). Plans are being developed for implementation of VBDCP for the next five years as a part of the 11^{th} five year plan. The Directorate has decided to focus on policy development, programme coordination and intensify monitoring, evaluation and operational research to guide the implementation of the strategies.

The IDR-report on institutional assessment of capacity of NVBDCP includes the following summary recommendations, which the JMM team endorses with minor modifications:

- Greater funding from the central government for all states similar to the practice in NE states
- Creation of the post of district nodal officer for VBDCP at least in endemic areas
- Greater involvement of district collectors and municipal officers in VBDCP
- Ensure residency of AWW and health workers in all designated geographic units
- Ensure adequate and timely payment of TA to supervisors and health workers
- Improve availability of transport at state, district and PHC levels.

Recommendations (additional)

1. Staffing at central level will need to be considerably increased during the first five year period. After a two-year induction period, staff from central level should be deployed in difficult states and districts and staff size at the central level should be downsized. It would therefore be better to employ new staff on a contract basis rather than to seek a major expansion of permanent posts. The JMM did not do a thorough analysis of human resource needs at levels due to lack of time. However the impression is that there is a need for strengthening the NVBDCP directorate with health economists, health planners, project managers, IT specialists, and training specialists. Staff should be organized in task forces with responsibility for specific products and services. *Ad hoc* advisory committees, including experienced field staff should be used in the preparation of guidelines.

2. The following practices applied in Gujarat could be attempted in other states:
    a. Establishing Block Health units led by a public health specialist to support the chief district health officers, and management support units at district level to improve program management and monitoring.
    b. Assigning the responsibility of supervising all VBDs in one district to a dedicated state VBD officers in addition to the responsibility of managing his/her own specific disease control program. This would help to promptly identify and address operational bottlenecks in program implementation.
    c. Monitoring district-wise performance of the VBD programme and providing feedback monthly by the state VBD directorate
    d. Improving the state health department's procurement policies through e-procurement, and pre and post dispatch inspections of commodities using accredited laboratories

3. The NVBDCP should update its guidelines and procedures for TA support for states based on its positive experiences with NIMR and medical colleges. In addition to training, the medical colleges should involved more in promoting better case management, program evaluations and outbreak investigations.

10.2. Integrated vector management

The main reason for the existence of a VBDCP is to ensure the rational use of available resources through application of a multi-disease control approach and integration of vector control and other disease control measures.

It was observed in Gujarat, where conditions are probably better than in most states, that in relation to pesticide management, there is a lack of clear operational guidelines, procedures and facilities for safe transport, distribution, storage and disposal of public

health pesticides. Most storage facilities visited were below standards, located in proximity of inhabitants. None of the safety procedures were in place, except that the stores were locked and access was restricted to trained personnel in charge of dispatching and using pesticides. Disposal of empty containers and bags is done locally. Awareness about the International Code of Conduct on the distribution and use of pesticides is very limited among state and district staff. The JMM teams that visited Orissa, Kerala, Bihar, and Andhra Pradesh also had made similar observations.

Integrated vector management is of course more than pesticide management and the management of insecticide resistance. It includes advocacy, social mobilization and legislative aspects, collaboration within and between public and private sectors; integration of non-chemical and chemical methods of vector control; local adaptation of strategies and methods; and capacity building.

Recommendations:

1. Use insecticides in the context of an Integrated Vector Management strategy taking into account the vector species, the disease transmission dynamics, the local conditions, the range of vector management options and the available resources.

2. Engage closely with other sectors, notably agriculture, environment and municipalities, to develop a harmonized approach to pesticide use in general, and to insecticide resistance management in particular, and accord with WHO guidelines and the Stockholm Convention recommendations on DDT.

3. Develop guidelines to assist States with better management of public health pesticides and with implementing the International Code of Conduct on the Distribution and Use of pesticides and organize frequent and targeted training to achieve the necessary expertise in pesticide management (selection, distribution, transport, storage, safe handling, use/application and disposal).

4. Include product packaging, labelling, stewardship, and disposal of used containers, in procurement tender specifications.

5. Develop strategic Vector Management Plans, including Contingency Plans for disease outbreaks

6. Ensure compulsory Health Impact Assessment of development projects with particular emphasis on vector borne diseases in water resources development areas and urban areas.

7. Considering the complexity of the VBD situation, extraordinary institutional capacity, and strong political commitment, a few states like Gujarat should further develop and document a true Integrated Vector Management Programme which could be a model for other states. This should include collaboration with municipal authorities to ensure a strong component for the management of vector borne diseases and of insect and rodent pests in urban settings.

8. As part of IVM Strategy, train District health/VBD/malaria officers in IVM planning to control other relevant VBDs in an integrated manner.

10.3. Training and supervision

At present there are no specific training programs for enhancing new skills required by state and district VBD program units on integrated vector management. There is a need for re-training all malaria programme staff categories. The opportunity of profound changes in the programme philosophy and national and international interest in VBDs should be seized to build capacity to tackle the VBDs in an integrated manner.

Recommendations:

1. Review all job descriptions of NVD staff and on that basis review training programmes and curricula. The greatest attention needs to be given to the following needs: (a) State level: Integrated vector management, Health economics, planning, monitoring and evaluation, research and training; (b) District level: Epidemiology including micro-stratification, programme management integrated vector management; (c) Block level: Supervision and quality control, including vector control supervision and management.

2. NVBDCP should undertake a rapid training needs assessment for the state and district program units in the light of emerging program demands, and commission appropriate agency to prepare training curricula, modules and train national trainers.

3. An integrated training on laboratory skills needed for all national disease control programmes (ie. TB, HIV) should be planned and conducted for all laboratory technicians in the health services. There should be one supervisory laboratory technician for each district for internal quality assurance.

4. The malaria IDR-report data indicates that the frequency of supervisory visits was high (around 30% in all States except Chennai). This suggests that it would not be difficult to introduce new guidelines for supervision. However, the JMM teams observed that in many states the supervision is ineffective, and possibly wasteful. Thus SOPs for supervision should be developed. A dedicated training on the SOPs for supervision should be conducted, and this must be supported by further supervision.

10.4. Financing and economics

Time constraints did not allow the JMM team to undertake any financial and economic analysis. However the team noted that for FY 2006-07 (April to March), the Gujarat State had allocated about Rs. 700 million on VBDP which was about 7% of it's total health budget. The support received from NVBDCP is estimated to be around Rs. 100 million. While it is difficult to quantify expenditures incurred by other departments, considering the overall intensity of VBD control activities in the state, the current resource allocation appears to be reasonable. However, additional resources will be required in the future. The state will more than double its development expenditure for its health sector during the 11^{th} plan period compared to 10^{th} plan (Rs. 13,500 million to Rs. 30,000 million). Nearly two thirds of this development expenditure will be spent on public health, which will certainly help the VBD control.

Recommendations

1. The states having good expenditure and program performance data, may estimate unit costs of different VBD control services including those provided by volunteer workers in urban and rural areas.

2. NVBDCP should undertake economic analyses to examine cost-effectiveness, cost-efficiency and allocative efficiency to have additional data to be able to choose between interventions and approaches to all VBDs.

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Annex 1: JMM Teams and the sites visited

0. The JMM Chairperson: DR DANIEL CHANDRAMOHAN, LSHTM, UK & WHO

1. JMM TEAM ONE (focus – malaria)

1. Dr. Allan Schapira, WHO - **Chairperson**
2. Dr. G. N. V. Ramana, World Bank
3. Mr Abdelaziz, World Bank
4. Dr R S Yadav, Deputy Director Sr. Grade, NIMR, ICMR – **Rapporteur**
5. Dr R K Das Gupta, Deputy Director, NVBDCP -**Technical Resource Person**

Sites visited: **State**: Gujarat ; **Districts**: Nadiad and Ahmedabad, and Ahmedabad city

2. JMM TEAM TWO (focus - malaria)

1. Dr A P Dash, NIMR, ICMR - **Chairperson**
2. Mr Rajeev Ahuja, World Bank
3. Dr Steven Bjorge, WHO
4. Dr S K Sharma, NIMR, Rourkela
5. Dr M S Malhotra, Deputy Director, NIMR, ICMR – Rapporteur
6. Dr A Chatterjee, NPO, WHO India - **Technical Resource Person**

Sites visited: : State: Orissa**; Districts:** Angul and Cuttack

3, JMM TEAM THREE (focus - malaria and dengue)

1. Dr Krongthong Thimasarn, WHO - **Chairperson**
2. Dr Sarman Singh , All India Institute of Medical Sciences, Delhi
3. Prof. P.C. Joshi, Dept of Anthropology, University of Delhi
4. Dr C P Batra, NIMR
5. Dr R.C. Dhiman, Deputy Director, NIMR, ICMR – **Rapporteur**
6. Dr R S Sharma, Joint Director, NVBDCP - **Technical Resource Person**

Sites visited: State: Delhi (MCD, NDMC areas)

4, JMM TEAM FOUR (focus – dengue, Chikungunya, Japanes Encephalitis)

1. Dr Michael Nathan, WHO - **Chairperson**
2. Dr Daniel Chandra Mohan, LSHTM & WHO – **Co-Chairperson**
3. Dr Dilip Mathai, Christian Medical College, Vellore, Tamil Nadu
4. Dr B.K. Tyagi, CRME, ICMR
5. Dr R Rajendran, CRME, ICMR – **Rapporteur**
6. DR I P Sunis CRME,ICMR - **Technical Resource Person**

Sites visited: State: Kerala**; Districts:** Allapuzha and Trivandrum

5. JMM TEAM FIVE (focus – Kala-azar)

1. Dr Pradeep Das, RMIMSR, ICMR - **Chairperson**

2. Prof Vijay Kumar, World Bank
3. Dr Philippe Desjeux, Institute of One World Health
4. Dr N A Siddique, RMIMSR, ICMR - **Rapporteur**
5. Dr Shampa Nag, National Consultant, WHO India - **Technical Resource Person**

Sites visited: **State**: Bihar; **Districts**: Muzaffarpur, and Vaishali

6. JMM TEAM SIX (focus – Lymphatic Filariasis)

1. Dr V Kumaraswamy, WHO - **Chairperson**
2. Dr P K Das, Director, VCRC, ICMR
3. Dr Derek Lobo, WHO
4. Dr N C Appaoo, Balaji Medical College, Chennai
5. Dr N Arunachalam, CRME, ICMR
6. Dr K Krishnamurthy, Deputy Director, VCRC, ICMR – **Rapporteur**
7. Dr C K Rao, NPO, WHO India - **Technical Resource Person**

Sites visited: State: Andhra Pradesh**; Districts:** East Godavari, and Visakhapatnam

7. JMM team seven (focus – malaria)

1. Dr J Mahanta, Director, RMRC (NE), ICMR - **Chairperson**
2. Dr P K Mohapatra, Deputy director, RMRC (NE), ICMR
3. Dr A Prakash, Deputy director, RMRC (NE), ICMR
4. Dr V Dev, Deputy Director, NIMR, Sonanpur, Assam

Sites visted: State: Assam; **Districts**: Golaghat, and Sonitpur

Annex 2 – List of key informants

1. JMM Team one

1.1.Government of Gujarat

1. Mrs. Sudhaben Anchaliya, Additional Chief Secretary (Health), Govt. of Gujarat, Gandhinagar
2. Dr. Amarjit Singh, Health Commissioner, Govt. of Gujarat, Gandhinagar
3. Ms. Mona Kandhar, Joint Secretary (Health), Govt. of Gujarat, Gandhinagar
4. Dr. B. K. Patel, Additional Director (Health), Govt. of Gujarat, Gandhinagar
5. Dr. P. B. Prajapati, Joint Director (NBVDCP), Govt. of Gujarat, Gandhinagar
6. Dr. S.R. Awasia, Regional Dy. Director, Ahmedabad
7. Mr. P. T. Joshi, State Entomologist, Govt. of Gujarat, Gandhinagar
8. Mr. G. Kurien, Hq Biologist, Govt. of Gujarat, Gandhinagar
9. Mr. PP Ojha, Malaria Officer hq, Govt. of Gujarat, Gandhinagar
10. Dr. M K Kapadia, Medical Officer hq, Govt. of Gujarat, Gandhinagar

1.2. Regional Office of Health & FW (GOI), Ahmedabad

11. Dr. Jai Karan, Regional Director
12. Dr. G. C. Shau, Medical Officer

1.3.National Inst. Of Malaria Research, Field Station, Nadiad

13. Dr. H. C. Srivastava, Asstt. Director
14. Dr. S. Haq, Research Scientist
15. Dr. C. S. Pant, Technical Officer

1.4.Ahmedabad Municipal Corporation

16. Mr. D. B. Makwana, Deputy Commissioner
17. Dr. S. P. Kulkarni, Medical Officer of Health
18. Dr. V. K. Kohli, Asstt. Entomologist
19. Dr SK Chauhan, MO, Urban Health Centre, Gomtipur
20. Dr. Ketki Jethwa, Urban Health Centre, Gomtipur

1.5. Bhaskaracharya Institute of Space Applications and Geo-informatics

1. 21. Dr T.P. Singh, Director

1.6. BJ Medical College

22. Dr. MM Anchalia, Addl. Director and Dean I/c
23. Dr. Vasudevbhai Raval, Prof.& Head P.S.M. and Director State Institute of Health & FW
24. Dr. B. D. Makad, Professor of Medicine

1.7. Kheda District

25 Mr. R. R. Varsani, District Collector
26 Mr. G. R. Chaudhary, District Development Officer
27 Dr. N. J. Patel, Chief District Health Officer (CDHO)
28. Dr. F. J. Gohel, CDMO cum Civil Surgeon, Civil Hospital
29. Mr. G. E. Christian, District Malaria Officer (DMO)
30. Dr RR Trivedi, BHO, Thasra
31. Dr DB Ugrejia, MO I/c, CHC Thasra
32. Dr BS Darji, MO, PHC, Pij
33. Dr , G Singh, MO, PHC Chaklasi
34. Dr KC Gadhvi, MO, CHC Alindra
35. Dr M. Patel, MO, PHC Dhunadra
36. Mr. M. Panchal, MPHW, Panvania sub-centre
37. Mrs. HM Shukla, ANM, Panvania sub-centre
38. Mr UJ Parmar, MLV, PHC Dhunadra

1.8. Ahmedabad District

39. Dr. R. R. Vaidya, CDHO, Ahmedabad
40. Dr J. Chawda, CDMO, Sola Civil Hospital, Ahmedabad
41. Dr P.L. Dave, Epidemic Medical Officer
42. Dr A Patel, Sr MO, I/c Divisional Training Centre, Bavla
43. Mr. Alok Kulshrestra, DMO, Ahmedabad
44. Dr Gaurang Patel, MO, PHC Zolapur

1.9. Indian Institute of Management, Ahmedabad

45. Prof D. Mavlankar, IIM Ahmedabad

2. JMM Team Two

2.1. Orissa state: Bhubaneshwar

Principal Secretary (Health)
Secretary (Health)
Director Health Services
State Programme Officers
Joint Director
Regional Director
Ex-State Entomologist

2.2. Angul District

District Collector
Chief District Medical Officer
Additional District Medical Officer
Medical Officer-in Charge of PHC
Doctors in PHCs
Technicians
Pharmacists
Anganwadi Workers
DDCs and FTDs Holders
Male Health Worker
Households

2.3. Cuttack District

District Collector
Chief District Medical Officer
Additional District Medical Officer
Medical Officer-in Charge
Professors of Medical College
Municipal Board Officers
Private Doctors
Technicians

3. JMM Team three

3.1. Delhi

1. Shri D.S. Negi, Principal Health Secretary, Govt. of NCT
2. Shri Wahi, Special Secretary, Govt. of NCT
3. Shri RP Vashishth, Govt. of NCT

3.2. Municipal Corporation of Delhi

1. Shri K. D. Akolia, Additional Commissioner(Health)
2. Dr. N K Yadav,Medical Health Officer
3. Dr. S.C. Arun, Deputy MHO
4. Dr. Jitendra Diwan, Epidemiologist, Rohini zone
5. Dr. AK Bansal, Deputy Health Officer, Rohini zone
6. Dr. O. P. Gahlot, DHO, Civil lines zone
7. Dr. Sinha, Entomologist, Rohini zone
8. Sri A. S. Sahrawat, Malaria Inspector
9. Sri J. P. Sharma, Malaria Inspector
10. Shri A K Sharma, MI
11. Shri Heera Lal, AMI
12. Shri Mahi Pal Singh, AMI
13. Shri Suresh Singh, AMI
14. Shri Mehendra Singh, AMI
15. Sri D. P. Nagar, A.M.I./LT, Malaria Clinic, Shahabad
16. Sri N. S. Mann, A.M.I./LT, Malaria clinic, Hindu Rao Hospital
17. Sri Dharam Pal, A.M.I.
18. Sri Mahavir Singh, Clinic Beldar, Hindu Rao Hospital

3.3 New Delhi Municipal Corporation

1. Dr. SK Garg, Medical Health Officer
2. Dr. P. K. Sharma, Epidemiologist
3. Dr. R.N. Singh, CMO
4. Sri Sunil Kumar, FTD

4. JMM Team four

Kerela state

Biswas Metha, IAS, Health Secretary
Mr. Dinesh Arora, IAS, Director NRHM , Kerala
Dr. Kuttamani, Director, Directorate of Health Services (DHS)
Dr. Raghavan, Addl.Director, (ADHS)

Allepuzha district

Mr. K.R. Viswambaran, IAS, District Collector
Mr. Nasser District, Panchayat President
Dr. Velayudham, District Medical Officer, DMO Office
Dr. T. Srinivasan, Deputy District Medical Officer
Dr.K.N. Prasad, RCH Officer
Mr. Biju Babjan, District Malaria Officer
Mr. K.Dev, District Mass Media Officer
Mr. Melvil, Biologist
Mr. K.Y.Johnson, Tech. Asst., Gr.I
Mr. K.Baskaran, Tech. Asst., Gr.II
Dr. R.S. Nisha, Administratice Medical Officer, Ambalapuzha
Dr. Muralidharan, Medical Officer, Thakazhi PHC
Dr. Rajan Hiseph Paipally, Project Director, KSIVID
Dr. A. Meharunissa, Principal, T.D. Medical College
Dr. Ramala Beevi, HOD of Microbiology, T.D. Medical College
Dr. Shoba, Dept. of Community Medicine, T.D. Medical College
Dr. Mohanan, HOD of Medicine, T.D. Medical College
Dr. Legha, Associate Professor , T.D. Medical College
Dr. Kamaruniza Begum, Superindent, District Hospital
Dr. Dixon, District Hospital
Dr. Abdul Salam, District Hospital
Dr. Rema Devi, District Hospital

Trivandrum district

Mr. Dr. Ayub Joseph, State Health Training Consultant (IDSP)
Dr. Sandya, Asst.Director (Filaria)
Dr. Radhakrishnan, DD, (M)
Mr. Rajkumar, Dy. Mass Media Officer
Mr. Vinod, Asst. Entomologist
Ms. Kala Devi, Asst. Mass Media Officer
Dr. Jagadeesh, ORT Officer
Mr. Gopakumar, State Mass Media Officer
Dr. G. Prema, District Medical Officer
Mr. Unnikrishnan, District Malaria Officer
Mr. Abeyan Tech.Asst. Gr.I
Dr. Jeevan, Superintendent, District General Hospital Thiruvananthapuram Dr. Dinesh Prabhu
Dr. V. Suresh, RMO
Dr. R. Anil Kumar, MO In Charge, CHC, Vizhinjam
Dr. Ramadoss Pisharady, Vice Principal, (Medical College)
Dr. Rajmohan, Superintendent SAT Hospital
Dr. Leela Ithamma, Prof.& HOD Community Medicine
Dr. Sara Vargheese, Prof. Community Medicine
Dr. Hanifa Beebi, Prof. PEID cell
Dr. B.Jayakumar, Prof. Dept. Medicine
Dr. Ramani, Prof. Microbiology
Mr. Farook, Associate Prof. Entomology
Mrs. Sudhar Mani, Asst. Professor Entomology
Dr. Meenu Hariharan, DME

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5. JMM Team five

Bihar State

Dr Manoranjan Jha, State Trainer, NSV, Regional Office for H & FW (Bihar & Jharkhand)

U.S. Kumawat, Executive Director SHS, Bihar

Muzaffarpu District

Vaishali District

6. JMM team six

a. Andrapradesh State

- Mr.P.K.Agarwal, Principal Secretary, Ministry of Health, Andhra Pradesh
- Dr.Ramesh, Secretary, Ministry of Health, Andhra Pradesh
- Dr.P.Venkateshwara Rao, Director of Health Services, Andhra Pradesh
- Dr.Kamala Mohan, SeniorRD, Regional Office for Health & FW, Hyderabad
- Dr.M.Mohan Rao, Additional Director (Malaria and Filaria), Ministry of Health and FW, Andhra Pradesh
- Dr.T.Prabakara Reddy, Deputy Director (Ent), Ministry of Health and FW, Andhra Pradesh
- Dr. Dr. A. Subbarao, Research Officer (Med), Regional Office for Health and Family Welfare, Hyderabad
- Dr.I.V.Rao, Director of Medical Services, Ministry of Health & FW, Andhra Pradesh

6.2. Visakhapatnam District

- Dr. P.Jagannadham, District Medical and Health Officer, Visakhapatnam
- Dr.K.Prabhakara Reddy, Asst. Director (Entomology), Zonal Office (Malaria) Visakhapatnam
- Dr. B.Appala Naidu, District Malaria Officer, Visakhapatnam
- Dr.Vanisri, Senior Medical Officer, Greater Visakhapatnam Municipal Corporation, Visakhapatnam
- Mr.S.Nageswara Rao, Asst. Malaria Officer, Malaria Training Centre, Visakhapatnam
- Mr.V.Eswaradu, Biologist, Greater Visakhapatnam Municipal Corporation, Visakhapatnam
- Mr.V.Subbarao, Sub-unit Officer, NVBDCP Sub Unit, Visakhapatnam
- Mr. T.Ramarao, Filaria Inspector, Anakapalle, Visakhapatnam
- Dr.B.Chandrasekaran, Medical Officer, Munagapakka PHC
- Dr.Kalyani Raman, Medical Officer, Payakaraopeta PHC
- Mr.B.Venkateswaralu, Lab. Technician, Payakaraopeta PHC
- Mr.P.Simhachalam, MPHS(M), Arratlakotta HSC, Payakaraopeta PHC
- Ms.Nagavaralakshmi, Anganwadi worker, Arratlakotta HSC, Payakaraopeta PHC
- Mr. Satyanarayana Male supervisor, Satyawaram SC, Payakaraopeta PHC
- Mrs. Ananthalakshmi, MPH (Female), Satyawaram SC, Payakaraopeta PHC
- Mr.D.Manikkam, Panchayat Surpanch, Thottada village, Munagapakka PHC
- Mr.Srinivas Rao, Community member, Thottada village,Munagapakka PHC
- Ms. Mahalakshmi, ANM, Thottada sub-centre, Munagapakka PHC

- Mr. P. Satyanarayana, Ex. Sarpanch, Munagapakka
- Mr. Venkat Rao, Press reporter, Munagapakka
- Mrs. Adhilakshmi, Women health volunteer, Munagapakka
- Ms.Budha Gangaiyamma, Patient, Thottada village, Munagapakka PHC
- Ms.Nagavaralakshmi, Anganwadi worker, Arratlakotta HSC, Payakaraopeta PHC
- Mahila Arogya Sangam members – Women health volunteers, Thottada village Munagapakka PHC
    - Ms.D.Umadevi
    - Ms.Mahalakshmi
    - Ms. T.Umadevi
    - Ms.M.Lakshmi
    - Ms.G.Gangamma Lakshmi
    - Ms. Venkatalakshmi
    - Ms.Nirmala
    - Ms.Susila
    - Ms.K.Lakshmi
    - Ms.D.Kannayamma
- Mahila Arogya Sangam members – Women health volunteers, Arratlakotta HSC Payakaraopeta PHC
    - Ms.T.Annamalai
    - Ms.M.Jothi
    - Ms.Narayamma
- Household members: Arratlakotta HSC, Payakaraopeta PHC
    - Ms.Logarasu
    - Ms.Sivaparvathi
    - Ms.T.S.Rathnam
    - Ms.Sachravani
    - Mr.Narayana Rao
    - Ms.Nagalakshmi
    - Ms.C.H.Ramu
    - Ms.S.Raunamma
    - Ms.K.Devandu
- Household members: Swayamvaram, HSC, Payakaraopeta PHC
    - Mrs. Appalakoda
    - Mr. B. Puchravel
    - Mr. Nagarajan
    - Mrs. Nokalamma
    - Mrs. Subhalakshmi
    - Mrs. Veeralakshmi
    - Mr. Subba Rao
    - Mr. K. Dadda Rao
    - Mrs. S. Krishnakumari
    - Mr. MVSN Murty
    - Miss. K. Shanthi

Household members: Munagapakka PHC

- Mrs. Satyanarayana
- Mrs. Varalakshmi
- Miss. Satyavati
- Mrs. Renuka,
- Mrs. Lakshmi

Mrs. Satyavati
Mrs. Adhilakshmi
Mrs. Sai
Mrs. Annapoorna,
Mrs. Botha Jaya

- Patients: Arratlakotta HSC, Payakaraopeta PHC
  Ms.Ramalakshmi
  Mr.Suriyakanth

6.3.East Godavari:

- Dr.Veerabadhra Rao, Medical Officer, FR&TC, Kakinada
- Dr.B.Shiva Shankar, Asst. Director (Ent), In-charge DMO & DPO, Kakinada,
- Dr.Jeyaram, DM&HO
- Dr.Appar Naidu, PSM , Rangaraya Medical College, Kakinada
- Mr.M.Subramaniam, District Collector, Kakinada
- Dr.G.S.Murthy, IMA President, Kakinada
- Dr.Phanikumar, Medical Officer, Rajanagaram PHC
- Mr.Adhinarayana Rao, PHS, Rajanagaram PHC
- Mr.Prasad, Lab. Technician, Rajanagaram PHC
- Dr.K.Phankoteshwara Rao, District Co-ordinator of Hospital Services, Rajahmundhry
- Dr.P.Gopikrishnan, Superintendent, District Hospital, Rajahmundhry
- Dr.R.V.S.M. Murthy, District Hospital, Rajahmundhry
- Dr.P.Ramesh Kishore, Surgeon, District Hospital, Rajahmundhry
- Dr.Pattanayak, Regional Filaria Training Centre (NICD unit), Rajahmundhry
- Mr.Ramana, NFCP control unit, Rajahmundhry
- Mr.Adhinarayana Rao, MPHS, Rajanagaram PHC
- Mr.Prasad, Lab. Technician, Rajanagaram PHC
- Ms.Anuradha, ANM, Narendrapuram HSC, Rajanagaram PHC
- Ms.Lakshmi , Patient, Narendrapuram HSC, Rajanagaram PHC
- Ms.KandiK.Chittibabu, Women Health Volunteer, Narendrapuram HSC, Rajanagaram PHC
- Ms.Ram Thulasi, MPW (F), Nandarada HSC, Rajanagaram PHC
- Ms..D. D. Bhavani, MPH (Female)
- Ms.Vellamma , Patient, Nandarada HSC, Rajanagaram PHC
- Ms.Tegmu Nagarathnam, Patient, Nandarada HSC, Rajanagaram PHC
- Dr. Shyamsundar, Medical Officer, Korukonda PHC
- Dr. C. H. Durgaprasad Medical Officer, Korukonda PHC
- Ms. Mariamma, Nurse, Korukonda PHC
- Ms. Nagarathnamma, patient, Korukonda PHC
- Ms. M. Mangamma, patient, Korukonda PHC
- Mrs. B.N. Lakshmi MPH (F),
- Mrs. P. Chandamma , Anganwadi Teacher,
- Mrs. B.N. Lakshmi MPH (F), Kappuvaram, SC, Korukonda PHC
- Mahila Arogya Sangam members – Women health volunteers, Korukonda PHC
  Ms. Devi

Ms. Eswari

- Mahila Arogya Sangam members – Women health volunteers, Kappuvaram, SC, Korukonda PHC
  Mrs. Nagamma
  Mrs. M. Ramalakshmy
  Mrs. M. V. Venkataramanna

- Household members: Korukonda HSC, Korukonda PHC

  Mrs. Sheikh Meera Begum
  Miss. D. Sathyawathy
  Mrs. Sheikh Ammachi
  Mr. Sheikh sattar
  Mrs. Sheikh
  Mrs. Nagalakshmi
  Mrs. Shyamala
  Mrs. Narasimhamoorthy
  Mrs. P. Tulsi
  Mrs. P. Neramma

- Household members: Kappuvaram HSC, Korukonda PHC
  Mrs. Venkatalakshmi
  Mr. B. Appoy
  Mrs. T. Lakshmi Devi
  Mrs. K. Poolakshmi
  Mrs. Kumari
  Mrs. Lakshmi
  Ms. Sarala
  Mrs. Mary
  Mrs. Padma
  Mrs. Padmavathy