



सत्यमेव जयते

Government of India

Yaws Elimination in India

a Step Towards Eradication



**National Institute of
Communicable Diseases**
(Directorate General of Health Services)
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September 2006

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Dr. ANBUMANI RAMADOSS



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Ministry of Health & Family
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Minister of Health
& Family Welfare

MESSAGE

The achievement of Yaws Elimination is significant in the history of public health care in India. The key of the success in this area was due to policy support, political commitment and resource mobilization.

The dedicated work of the health authorities of endemic States/Districts in implementing and monitoring the Yaws Eradication Programme (YEP) and serving the endemic tribal areas ably coordinated by the National Institute of Communicable Diseases (NICD), which functioned as the national coordinating agency, is praiseworthy.

I congratulate the Directorate General of Health Services and the NICD for bringing out the publication “**Yaws Elimination in India- a step towards Eradication**” documenting the disease history, its epidemiology and India’s strategy for Yaws elimination. This will provide comprehensive information on Yaws for the use of health administrators/professionals and Public Health workers.

I wish that efforts under the programme will be sustained towards achieving Yaws Eradication.

(Dr. Anbumani Ramadoss)

Dr. Shiv Lal

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National Rural Health Mission
Healthy Family, Healthy Village, Healthy Nation

Smt. PANABAACA LAKSHMI



MINISTER OF STATE
FOR HEALTH AND FAMILY
WELFARE
GOVERNMENT OF INDIA

September, 2006

MESSAGE

I am indeed proud to learn that after achieving eradication of Smallpox and Guinea Worm disease and elimination of leprosy, Yaws Eradication Program (YEP) being implemented through National Institute of Communicable Diseases, Delhi (NICD) has successfully achieved the first step, i.e., Yaws Elimination. The challenging part of the implementation of the program is scattered over 49 districts of ten states and there, to detect cases, as well as treat these cases and their close contacts.

I appreciate the sincere efforts of Directorate General of Health Services, National Institute of Communicable Diseases and endemic states for achieving Yaws elimination in the country within the targeted period.

A document entitled "Yaws Elimination-A step towards Eradication" describing Yaws situation in India being published will be of much help to systematically pursue the further activities and will act as a base for further documentation of events once eradication is achieved.


(PANABAACA LAKSHMI)

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Dated 5th September 2006

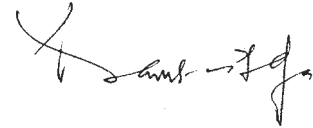
MESSAGE

Investment made to eliminate or eradicate diseases is considered a sound public health strategy. Despite the high burden of disease in developing countries, success is possible and has been achieved even against great odds. This was evident when India eradicated smallpox and guinea worm disease (their last cases occurred in the country in May 1975 and July 1996 respectively). Now the country is on the threshold of eradicating another disease, i.e. Yaws.

The availability of a cost-effective intervention, i.e. a single injection of Benzathine Penicillin (long acting penicillin) for curing the patients, made the disease amenable to elimination; the challenge lay in timely detection and prompt treatment of cases and their contacts. The task was, however, never an easy one as the disease was endemic in mostly inaccessible areas and the resources allocated to achieve the target were minimal and needed to be utilized effectively, efficiently and equitably.

Sound programme strategies evolved by the Task Force chaired by the Director General of Health Services and implemented by the endemic states and districts closely monitored by the National Institute of Communicable Diseases resulted in a gradual decline of disease after 1996. Absence of reported cases of early Yaws duly validated by independent appraisals indicate that country has achieved elimination of Yaws-a major step towards its ultimate eradication.

Yaws elimination in India amply demonstrates the great health effect that is possible when resources are applied well. The succinct document on “Yaws Elimination-A step towards Eradication”, being brought out by the National Institute of Communicable Diseases, will provide a useful resource for health professionals, students and researchers. I sincerely wish the efforts for Yaws eradication all success in achieving their goal by the stipulated timeline.



(Prasanna Hota)

Secretary to the Government of India



Samlee Plianbangchang
M.D. Dr. P.H.
Regional Director
WHO South-East Asia Region

MESSAGE

On behalf of the World Health Organization, I congratulate the Ministry of Health and Family Welfare and the concerned health officials and staff in the endemic states and districts, on the achievement of a significant milestone in public health field – elimination of Yaws from India.

It is heartening to know that India has not reported any new infectious case of Yaws since 2004, and that this zero-disease incidence status has been validated through a suitable process of annual appraisals by competent persons. This success is the result of intensive efforts since 1997, when the National Yaws Eradication Programme was launched.


I understand that India is now aiming at eradication of Yaws by 2008, defined as zero-disease-incidence with no evidence of transmission of disease agent, which can be determined through a sero-survey in under-5 children in the previously endemic areas. WHO will be happy to provide the required support to this exercise.

This document, “Yaws Elimination in India – A Step Towards Eradication”, brought out by the National Institute of Communicable Diseases will provide useful information for the management of elimination or eradication programmes for other communicable diseases in the South-East Asia and other Regions.

Besides the health benefits, this achievement in Yaws elimination will certainly have an impact on poverty reduction because Yaws is predominantly a disease of extreme poverty, affecting the most marginalized groups, residing in remote and hard-to-reach areas.

WHO is indeed very proud of being a partner with the Government of India in the elimination of Yaws, by providing technical inputs as well as modest financial support for some critical activities, such as the annual appraisals.

WHO will continue to provide the required back-up to India's efforts towards eradication of Yaws by the targeted date of 2008.



Samlee Plianbangchang

M.D., Dr.P.H.

Regional Director



Professor N K Ganguly

Director General ICMR



September, 2006

MESSAGE

The story of Yaws Elimination in the country, like those of Smallpox and Guinea Worm Eradication will go down as a major success in the history of public health in India. Smallpox Eradication virtually set the engine rolling and inspired health managers to go full steam for Yaws Eradication also. Now in 2006, we have been able to eliminate Yaws, the first step towards Yaws eradication. Remarkably, this has been achieved in a short span of a decade from 1996 to 2006.

The process of eradication is an extremely complex one. This includes case finding and treatment along with adequate contacts, yearly active case search, routine and special surveillance, review of the programme, intersectoral coordination etc. These need verification and recording for posterity. The National Institute of Communicable Diseases, the nodal agency has documented all the important activities under the program in a document "Yaws Elimination in India- A Step Towards Eradication".

This informative, valuable and concise document will provide a useful resource for health professionals, scholars and researchers. I am confident that NICD will continue its activity with the same zeal, vigor and achieve eradication of Yaws within the stipulated time frame.

I wish the program success

N. K. Ganguly
(N. K. Ganguly)

Dr. R.K. Srivastava
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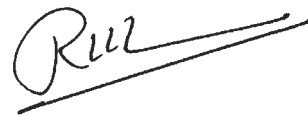
Date: 4th September, 2006

Foreword

The declaration of Elimination of Yaws from India by the Honorable Union Minister of Health & Family Welfare heralds a proud moment for all Health personnel in India. A vast expansion of health care infrastructure and man power since independence, ably supported by adoption of sound strategy successfully resulted in eradication of smallpox and guinea-worm, and elimination of leprosy earlier. It encouraged us to intensify our efforts to eradicate Yaws, a scourge of the under-privileged, once prevalent in remote hilly and forested areas.

India has successfully achieved elimination of Yaws with no early infectious case reported since 2004. The target date for eradication has been revised to 2008/2009, i.e., no sero-reactivity to RPR/VDRL in under-five children, after achieving nil reporting of early infectious cases for three years. India has been conducting independent appraisals of the Yaws Eradication Programme periodically since 2000; these have been very useful in monitoring the progress of Yaws eradication and in advising the national and state authorities on strategies and actions needed to intensify efforts. The stupendous achievement of elimination of a dreaded scourge has been made possible by dedicated work of thousands of persons in various Yaws-endemic States.

I congratulate Dr. Shiv Lal, Addl. DG & Director, NICD, Delhi and his faculty who have done an excellent job in bringing out the document entitled 'Yaws Elimination - A Step Towards Eradication' This records the history, impacts and progress of the disease and strategy for its eradication in India and progress made along with supportive data and information. Besides serving as reference document, the monograph will also help countries where Yaws remains a public health problem in planning their strategic approach and programme. The document will, I hope, stimulate rethinking on possible elimination/eradication of other diseases.



(Dr. R.K. Srivastava)



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Preface

The accomplishment of smallpox eradication in 1977 prompted public health professionals in India to identify other potential candidates for eradication. In the process, Guineaworm disease, which caused great disability, and Yaws, a disfiguring and crippling disease, were identified as the potential diseases which could be targeted for eradication, thanks to the vision and foresightedness of Padmashree late Dr. M.I.D. Sharma, the then Director of the National Institute of Communicable Diseases (NICD).

The Guineaworm Eradication Programme, launched in 1983-84, successfully achieved the target of eradication in 2000. The Yaws Eradication Programme (YEP) was launched in 1996-97 initially as a pilot project in Koraput district of Orissa and later expanded to cover all the 49 endemic district of ten states by 2000. The strategies formulated by NICD were implemented utilizing the existing resources through State Health Directorates.

It gives me immense satisfaction that our dedicated and concerted efforts over a 4-year period achieved 'nil' status of new cases of Yaws in 2004. This was validated by Independent Appraisals and was examined by an Expert Group chaired by Dr. S. Pattanayak, Former Regional Advisor, SEARO/WHO. The Task Force under the Chairmanship of the Director General of Health Services, Govt. of India, which met on 31 May, 2006 considered the report of the Expert Group, and recommended declaration of Yaws Elimination from the country.

I acknowledge the valuable contributions of several organizations, different Health Directorates, experts and above all the community members which made this achievement possible. We are grateful to the World Health Organization for providing technical inputs and financial support for different activities under the programme, such as Independent Appraisals, Yaws Surveillance Teams, etc.

The faculty of NICD supported with officers of WHO Country Office, India have made a commendable effort to chronicle the significant steps in our march to achieve the public health challenge of Yaws Elimination in this publication and will be helpful to all those having interest in elimination/eradication of diseases.



(Dr. Shiv Lal)

Date: 08.09.2006

Abbreviations

A.P.	Andhra Pradesh
CDMO	Chief District Medical Officer
CG	Chattisgarh
CHEB	Central Health Education Bureau
DHS	Director of Health Services
EQA	External Quality Assurance
FTA-Abs	Fluorescent Treponemal Antibody Absorption
HFU	Health for All and in particular for Underprivileged
ICDS	Integrated Child Development Scheme
ICMR	Indian Council of Medical Research
ICMRT	Indian Council of Medical Research for Tribals
IEC	Information, Education and Communication
ITDA	Integrated Tribal Development Authority
M.P.	Madhya Pradesh
MC	Microcentrifuge
NICD	National Institute of Communicable Diseases
RPR	Rapid Plasma Reagin
SFC	Standing Finance Committee
SOE	Statement of Expenditure
TF	Task Force
TPHA	Treponema Pallidum Haemagglutination Tests
TPI	Treponema Pallidum Immobilisation Test
TRUSTe	Toliridine Red Unheated Serum Test
UC	Utilization Certificate
VDRL	Venereal Disease Research Laboratory
YEP	Yaws Eradication Programme
YST	Yaws Surveillance Team

1

Introduction

Yaws is a chronic bacterial infection caused by *treponema pallidum* subspecies *pertenue* which mainly affects the skin and bones and is a disfiguring, disabling, non-venereal infection. The organism responsible for bringing it about is evolutionarily close to the one causing syphilis and yet the infection is not as widespread, well known or virulent, relegating it to neglect compared to the other disease. It is prevalent among the people living in primitive, unhygienic conditions in hot and humid areas like those found in tropical countries. The infection puts the marginalized population living in remote, inaccessible hilly and tribal areas at a further disadvantage because of the morbidity and disability associated with the disease.

The infection puts the marginalized population living in remote, inaccessible hilly and tribal areas at a further disadvantage because of the morbidity and disability associated with the disease.

In areas, where yaws has long been endemic, there are always synonyms for it in local language. Of about 80, some of its synonyms are: Pian (French), Framboesia (Dutch/German), Buba (Spanish), Bouba (Portuguese), Parangi (Sri Lanka), Coco (Fiji island) and Dube (Gold Coast). The term “Yaws is thought to be of Caribbean origin. In the language of the Caribs India people, “Yaya” was a word for “a sore”.

It is an easily curable disease. One injection of long acting penicillin is enough to treat a case and to prevent yaws and cases contacts. Man is the only natural source of infection. No other animate or inanimate reservoir exists. Yaws spreads from infected persons through intimate, body to body contact which can be checked through health education, timely, prompt treatment of cases with long acting penicillin and prophylaxis of contacts. These control measures are simple, effective and available within the limited resources.

In a WHO Inter-country Workshop held at Jakarta, Indonesia in 2004, Yaws Eradication was declared a regional priority for South East Asia and Yaws was considered to be an eradicable disease.

In the 1950s a mass campaign for treatment of cases and contacts with mass administration of penicillin was launched with assistance from WHO.

In the 1950s a mass campaign for treatment of cases and contacts with mass administration of penicillin was launched with assistance from WHO. The World Health Organization provided the necessary medicines and UNICEF some supportive supplies. This resulted in a marked reduction of yaws cases in India and the disease prevalence came down from 14.0 percent to below 0.1 percent in many areas. This and other epidemiological features of the disease also testify that eradication of the disease is indeed feasible.

Factors Favourable for Yaws Eradication

- Man is the only reservoir
- Patients with early lesions are the main sources of infection
- Direct contact with secretions of skin lesions is the main mode of transmission; no vector involved
- Effective treatment for cure available
- Treatment is safe, effective and operationally feasible
- Disease restricted to a few remotely located tribal communities
- Mass campaigns aimed at total population examination to detect cases and treat them along with contacts have greatly reduced the prevalence and transmission
- Improvement in personal hygiene, sanitation, community awareness of the disease, especially free availability of effective treatment and improved socio economic conditions facilitate reduction of transmission
- These control measures are simple, effective and available within the limited resources. No new technology is, therefore, required to implement the program.

Considering all these facts, the Government of India approved the launching of the Yaws Eradication Program in India in 1996-97. Careful implementation of the program resulted in zero incidence of the disease in the country by 2004. The zero incidence was validated by eminent experts and the Task Force on Yaws Eradication under the Chairmanship of the Director General of Health Services, Government of India recommended for the declaration of Yaws Elimination in 2006.

This document, in a concise way, tries to chronicle the processes that were involved in achieving elimination and the attributes which are believed to have led to this success. This could act like a guiding light and prove to be useful to other countries where yaws is still prevalent. It could also be an example to the other national health programs aiming to achieve elimination and eradication of various diseases.

Yaws Elimination: Nil reporting of new early yaws case supported by laboratory investigations and on the basis of good quality search in all endemic areas of the country and validated by independent appraisal

Yaws Eradication: Absence of new cases for a continuous period of three years, supported by absence of evidence of transmission through sero-survey among under-five children (i.e. no sero reactivity to RPR/VDRL in < 5 yr children).

2

Epidemiology

Agent factor

Causative organism

Treponema pallidum, the causative organism of syphilis was discovered in 1905 by Fritz Schaudinn and in the same year Castellani discovered its subspecies *pertenue*, the causative organism of yaws. Because of their small size and mass, they cannot be seen with an ordinary microscope unless a dark-field condenser is used. They look like thin, silver threads coiled like a corkscrew, and move with a characteristic rapid spinning motion.

The treponemes of yaws, pinta and the different types of syphilis are closely related. Infection with one organism provides partial protection against infection by another, which indicates that they share common antigens. There is no laboratory test that can distinguish these treponemes from one another. But, *T.pallidum subsp. pertenue* displays pathogenic properties different from that of *T.pallidum subsp pallidum*. The difference is probably due to their alleles termed as tprD3.

There is no laboratory test that can distinguish these treponemes from one another.

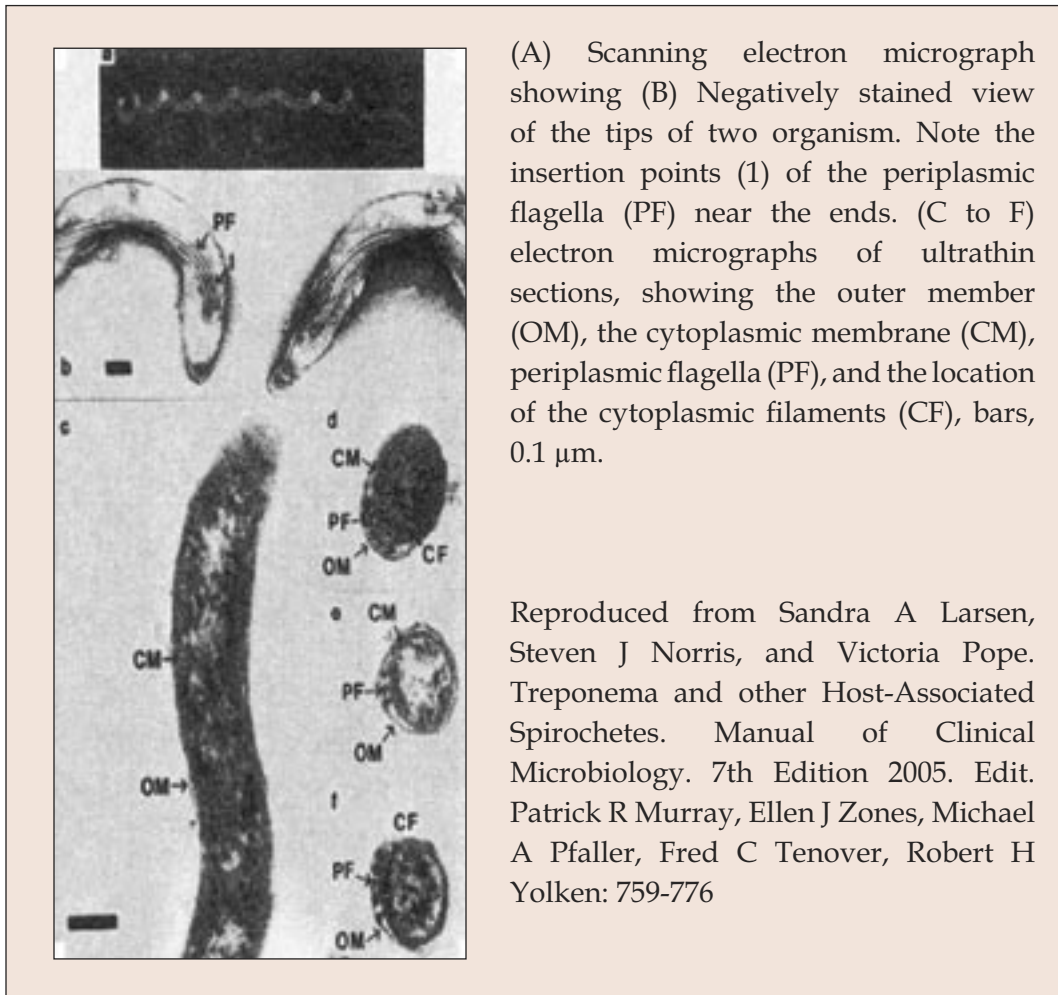
Though yaws as a disease entity came to be known only after 1905, the disease has been in existence since antiquity. On November 17, 1992, the New York Times reported that bones discovered in a cemetery of an ancient Greek colony in southern Italy contain unequivocal evidence of the presence of syphilis in Europe in an era well before Columbus. The archeology team has pointed out that the bone change might represent yaws.

Morphology of *Treponema pallidum* sub sp *pertenue*:

Genus: *Treponema* **Species:** *pallidum*, **sub-species:** *pertenue* (Figure 1)

Figure 1

Morphology of *Tr.pallidum*.



- They are motile, about 3-18 μm long, and have 8 to 20 corkscrew spirals.
- They are helically coiled organisms having a corkscrew-like shape. They stain very poorly because their thickness approaches the resolution of the light microscope.
- The organisms are delicate requiring pH between 7.2 - 7.4, temperatures in the range 30°C to 37°C and a microaerophilic environment.
- The structure of these organisms is somewhat different: the cells have a coating of glycosamino-glycans, which may

- be host-derived, and the outer membrane covers the three flagella that provide motility.
- In addition, the cells have a high lipid content (cardiolipin, cholesterol), which is unusual for most bacteria. Cardiolipin elicits “Wassermann” antibodies that are diagnostic for syphilis.
 - *Treponema* possess a complex antigenic makeup that is difficult to determine because the organisms cannot be grown *in vitro*.

Mode of transmission

It is a contagious disease transmitted by direct (person-to-person) contact with an infectious yaws lesion. Contaminated clothing and flies may also transfer it. But the role of fomites in yaws transmission is insignificant. *Treponema pertenue*, the bacterium that causes Yaws, can't penetrate into unbroken skin. It also can't pass through the placenta. The spread of yaws may be facilitated by overcrowding and poor community sanitation. The lack of water and soap for bathing and washing and of shoes and clothing for children between ages of 5 and 15 years are said to favour yaws transmission.

The spread of yaws may be facilitated by overcrowding and poor community sanitation. The lack of water and soap for bathing and washing and of shoes and clothing for children between ages of 5 and 15 years are said to favour yaws transmission.

Incubation period

After the bacterium has “penetrated” into the skin, within a period of 3 to 4 weeks (with a range from 10 to 90 days), early lesion appears near the infection. Early secondary lesion appears usually after an interval of 6-16 weeks (or even upto 2 years) of the primary lesion. By the end of five years, destructive and often deforming lesions of the skin, bone and periosteum appear.

Period of communicability

The total duration of infectiousness for an untreated yaws patient, including relapse is probably of the order of 12-18 months.

Host factors

Age-sex distribution

Young children constitute the most vulnerable age-group. However, in a previous survey from India, out of 21 yaws case 10 were below 15 years of age. However, analysis of 248 clinically diagnosed yaws cases from three yaws affected districts in India revealed the prevalence of 35.1 percent among <15 children and for 1-4 years, 5-9 years and 10-14 years, it was 5.6 percent, 15.3 percent and 14.1 percent respectively. Studies from other countries have reported more than 50 percent cases in young children. Male:female ratio was 1:0.73. Other workers have also reported a similar sex distribution.

The high prevalence in higher age-group as revealed by Indian studies could be possibly due to latent early infections or chronic relapse. Another explanation is that, these people remained unexposed to yaws as active control measures were being undertaken when these people were in their young age-group. However, the referred studies pertain to a period when active yaws transmission was going on, unlike present status of yaws disease in the country, where active transmission has probably ceased to occur.

Immunity

Man has no natural immunity. Acquired immunity develops slowly and may take months or years to develop fully unless suppressed by treatment. There is considerable experimental and epidemiological evidence that yaws provided partial immunity to venereal syphilis.

Problem of latency

It has been long realized that, sub-clinical infection was far more prevalent than had been recognized. Early lesions disappear with time even sometimes without treatment and enter into a phase of latency. The state of latency can be interrupted at any time by the reappearance or relapse of infectious yaws lesions. The eruptions of these lesions occur at intervals for up to 5 years.

The relapsing lesions tend to be localized to the periaxillary, perianal, or circumoral areas.

The total comprehension of yaws problem needs knowledge of population exposed to risk (contacts), population infected but not manifesting (latent), and population manifesting the disease. It is reported that, for one single case of yaws, there might be five to ten sub-clinical cases. Under the yaws control programme, the latent cases must be actively searched for and given full treatment.

Problem of under-reporting

Another problem which has direct effect on the programme, is under-reporting which could be due to:

- a) yaws, in initial stages is generally non-fatal condition, and these characteristically do not command the attention of afflicted person or the health authorities.
- b) Yaws is extremely focal with respect to time (when), and place (where).
- c) Yaws occurs almost entirely in remote rural/tribal areas. (Among the people served by the most peripheral units of the health care system i.e., sub-centre. These facilities are usually poorly staffed, supplied, supervised. Communication link to the next level in the reporting hierarchy may also be poor.
- d) In late stage, yaws being a disabling disease, it prevents many patients to walk to the nearest health centre.

Attenuation in yaws disease

With receding yaws, the numbers of infectious lesions go on decreasing and iceberg phenomenon is said to develop. The nature of these lesions also changes. It has been observed that the foci of infections, where up to 80 percent of the population showed sero positivity, only a few clinical cases could be identified. Furthermore, in contrast with the florid multiple lesions of former yaws the early signs are relatively mild. Whether or not the devastating late lesions will follow this

relatively mild form (if left untreated) is unknown. However, the medical officers should be made aware of this phenomenon in areas of low endemicity.

But with the socio-economic development and availability of some sort of treatment with antibiotics in tribal areas which is effective for *Tr. pallidum sub.sp.pertenue*, NICD recent experiences suggest that “Attenuation” may not be any longer a problem.

3

Clinical Manifestations

Early yaws

Yaws begins when the bacterium penetrates the skin at a spot where it was scraped or cut. The first lesion is the mother yaws, and there is often regional lymphadenopathy. Early/primary lesions of this disease manifest in the form of skin lesions (Fig.2), which on healing show little scarring. It occurs at the site of infection, although the organism may already be widely distributed. It starts as a small papule, but reaches up to 5 cm in diameter, becomes lifted, is often ulcerated, and may resemble a raspberry. There is edema and cellular infiltration, usually mononuclear, most marked around the dermal blood vessels. Chronic granulomatous ulceration occurs from which the spirochetes may be readily recovered. Papilloma is the most prevalent presentation. Early lesions can often be pruritic, and scratching facilitates spread of the infection to other areas of the body by autoinoculation and the transmission of the disease

Figure 2

Papillomatous lesions of early yaws in arm and leg of a young boy



Early lesions can often be pruritic, and scratching facilitates spread of the infection to other areas of the body by autoinoculation and the transmission of the disease within the community.

within the community. These lesions tend to occur in crops and mixed (polymorphous) forms of lesions are often present in the same patient.

A change in climate may influence the number and morphology of yaws lesions. In the dry season, fewer lesions are present which tend to be of macular type; papillomata tend to retreat to the more humid areas of the body surface such as axilla and anal folds.

Despite the variety of yaws lesions, in the endemic areas the disease can usually be accurately diagnosed on the basis of clinical findings alone.

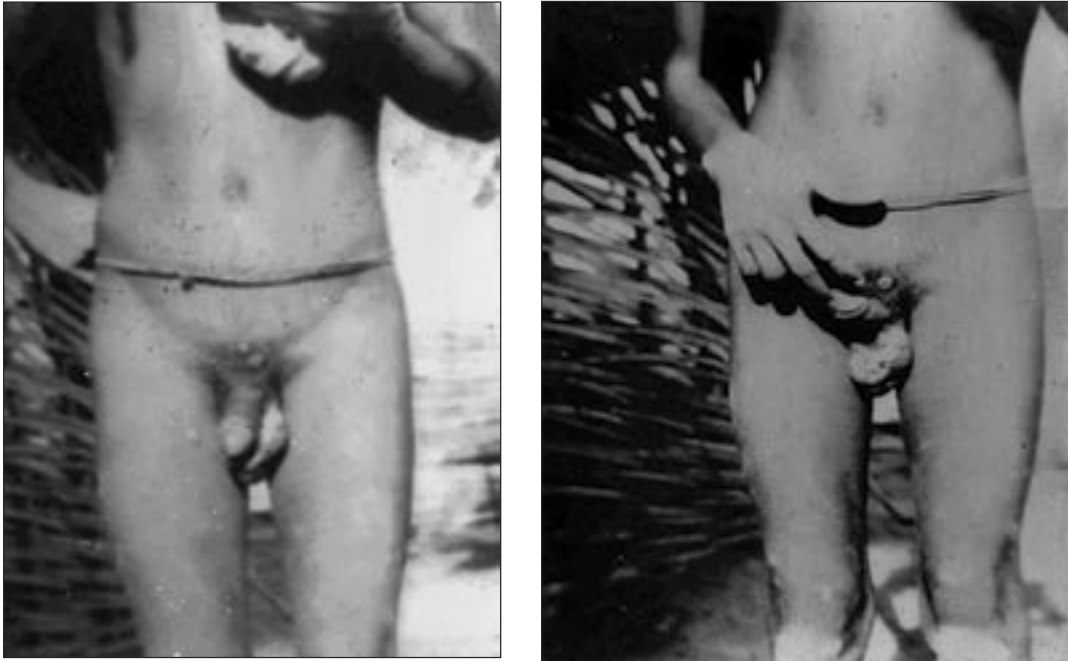
There is usually an interval of 6-16 weeks (or even upto 2 years) before the patient complains of general ill health. The primary lesions have often disappeared by then unless there is a superimposed pyogenic infection. The early secondary skin lesion is papular and may occur any time from 4 to 12 weeks after the initial infection. The rash covers the limbs, neck, and buttocks and may spread onto the body (Figure 3). It is at this stage that the serological tests become positive. The patient may complain of bone and joint pain, and all symptoms may persist for up to 6 months.

Regional lymph nodes may be enlarged. In yaws, there may be ulcerations and nodular lesions around the mouth and anus.

The early secondary lesions depend on the location. At moist mucosal surfaces, such as the mouth and anus, ulceration is extensive, but elsewhere they may remain dry. Both the early and the early secondary lesions may heal without scarring or may leave residual scars, some of which become depigmented. Some of the scars are paper-thin and easily secondarily infected: recurrent treponemal infection frequently occurs where there have been skin lesions before.

Figure 3

Granulomatous lesions of yaws in groin region



Late yaws

The late yaws lesions are also granulomatous but, often necrotic due probably to tissue hypersensitivity. Frequently secondary infection adds to the tissue destruction. These lesions may proceed to fibrosis. Around joints there may be dense fibrotic nodules with little inflammatory reaction.

The disease can be progressive wherein bone and cartilage are affected leading to disability (Figure 4.a). Bone infection occurs in both the early and the late stages and may cause pain. The secondary lesions are usually multiple and occur in numerous bones simultaneously. They may heal completely or result in periosteal thickening and fibrosis. The long bones become greatly thickened and irregular and, because they are architecturally weakened and soft, they may become bowed to give the classical “saber” configuration. The pattern of bone infection varies in different parts of the body and with

Figure 4

Bony deformity(a) and Gangosa(b) in late yaws



Pathological fractures can occur because the affected bones become weakened and brittle as a result of chronic osteomyelitis. Yaws might develop gummatous lesions with destruction, which may become secondarily infected and result in sinus formation.

the different treponematoses. Pathological fractures can occur because the affected bones become weakened and brittle as a result of chronic osteomyelitis. Yaws might develop gummatous lesions with destruction, which may become secondarily infected and result in sinus formation. When the facial bones are involved, the resulting deformities can be bizarre. Gangosa (rhinopharyngitis mutilans) are lesions occurring

by direct extension of early mucocutaneous yaws lesions at the borders of nose and mouth (Figure 4.b) into the nasopharyngeal mucous membranes, followed by bacterial superinfection and ulceration.

Differential diagnosis

The greatest challenge in differential diagnosis remains venereal syphilis. As no laboratory test exists that can distinguish serologically between yaws and venereal syphilis, the diagnosis is ultimately a clinico-epidemiological one. Bone

Classification of yaws lesions

The nomenclature and classification of yaws lesions are as under:

Early yaws lesions	Examples	Infectiousness*
Initial lesions	Papilloma	+++
Papillomata	Papillomata	+++
Macules	Serpiginous papilloma Seuamous Macules Palmar, Plantar	+
Maculopapules	Maculopapulomatous Mucocutaneous	++
Papules	Sqamous Micropapules	++
Micropapules	Polymorphous	++
Nodules		+
Plaques		+
Hyperkeratosis	Plantar	-
	Palmar	
Bone and joint lesions	Polydactylitis	-
	Osteoperiostitis	-

Late yaws lesions	Examples	Infectiousness*
Hyperkeratosis	(hyperkeratotic lesions may be similar in both late and early yaws)	
Nodular	Scars	-
Ulcerated nodular	Gangosa	-
Plaques	Osteoperiostitis	-
Bone and joint	Saber tibia; gondou; monodactylitis	-
Juxta-articular nodules		-
*+++=highly infectious ++=very infectious, +=infectious, -= not infectious		

lesion of yaws can be identical to those of venereal syphilis, endemic syphilis, tuberculosis, osteomyelitis and sickle cell disease. Nasopharyngeal lesions can mimic mucocutaneous leishmaniasis, rhinosporidiosis, rhinoscleroma, leprosy, tuberculosis, South American blastomycosis. However, few diseases commonly confused with yaws are as follows:

Lesions are prominent around finger webs and the anterior surface of elbows and wrists. Scabies is frequently accompanied by severe itching.

- **Impetigo:** A common skin infection of children caused by streptococci or staphylococci
- ***Tinea versicolor (pityriasis versicolor):*** A superficial skin infection caused by the fungus, *Malassezia furfur*, characterized by fawn coloured scaling macules or patches on shoulders, chest, upper back and abdomen
- ***Molluscum contagiosum:*** A viral disease of the skin producing pink or white papules with a prominent central core, which may appear anywhere in the body.
- **Scabies:** Infestation of human skin by *Sarcoptes scabiei*, producing cutaneous papules or vesicles caused by burrowing into the skin of the mite. Lesions are prominent around finger webs and the anterior surface of elbows and wrists. Scabies is frequently accompanied by severe itching.
- **Lichen planus:** A chronic inflammatory disease of unknown etiology characterized by flat-topped, shiny papules with a characteristic violet hue.
- **Tropical ulcer (*ulcer tropicum*):** A painful ulcer that usually occurs on the lower limbs in the human tropics. It is caused by a mixed infection with "*Treponema vincentii*", *Fusobacterium nucleatum* and other bacteria. In contrast to yaws ulceration, tropical ulcers have well defined edges, a purulent base, and may penetrate into tendons and bone.
- **Plantar warts (*Verruca plantaris*):** A tender, flat wart on the sole of the foot caused by a papovirus; may be confused with plantar papilloma.
- **Tungiasis (jiggers):** Plantar lesions caused by the burrowing of the female sand-flea, *Tunga penetrans*.

- **Cutaneous leishmaniasis:** An indurated, usually solitary nodule or chronic ulceration caused by *Leishmania* species.
- **Leprosy:** The lesions are both lepromatous and tuberculoid forms of leprosy caused by *Mycobacterium leprae* may be mistaken for yaws. However, loss of sensation never occurs in yaws.
- **Psoriasis:** This chronic hereditary skin disease may sometimes be mistaken for yaws. Its distinctive lesions are red macules covered almost to their edges by whitish or silvery lamellated scales. It usually involves the knees, elbows, trunk, and scalp.

Apart from the above, Idiopathic keratoderma, ecthyma and deep mycosis may also simulate yaws.

4

Laboratory Diagnosis and Sero surveillance

Laboratory support to yaws eradication

Laboratory plays a very important role in the yaws eradication Programme in the following areas:

- For confirmation of a suspect case of yaws.
- Laboratory support for sero surveillance to demonstrate the evidence of transmission of yaws in the community.

The laboratory diagnosis is primarily based on either

- a. Direct demonstration from lesions by microscopy examination.
- b. Demonstration of antibodies in the patients' sera by a variety of serological tests.

Direct demonstration

The different microscopic techniques used are i) Dark field microscopy ii) Phase contrast microscopy and iii) Direct fluorescent antibody microscopy. However, all these techniques



require a fresh clinical sample from the early or early secondary lesions and are quite cumbersome, technically demanding and not field friendly.

Darkfield examination: The treponemes being very small are not seen under ordinary microscope. Under dark ground illumination, pathogenic treponemes appear as silver threads, 13 times as long as diameter of RBCs. Several regular spirals (1.5 μm) tightly wound along their lengths with characteristic corkscrew motility with frequent flexion movements. The test requires experienced manpower, is costly and therefore can be used at intermediate and referral laboratories only.

Therefore, the main reliance is on serological testing which is useful in all the stages of the disease, besides obviating the need for fresh samples.

Serology

Serological tests to detect treponemal antibodies are useful in diagnosis of yaws only if sexually transmitted syphilis is excluded.

Serological tests to detect treponemal antibodies are useful in diagnosis of yaws only if sexually transmitted syphilis is excluded. In field situation, these tests support a clinico-epidemiological diagnosis of yaws but are not as specific as the darkfield examination. Commonly used tests are Venereal Disease Research Laboratory (VDRL) test and the Rapid Plasma Reagin (RPR) test. The reagents and control sera needed to perform these tests have been standardized and are commercially available. Both the tests (VDRL & RPR) are inexpensive, rapid, and simple to perform. It takes time for sero-positivity to appear after the onset of disease and hence, initial (mother) case may be sero-negative.

To date, no routine laboratory method is available to distinguish the other pathogenic treponemas from each other or from syphilis. The standard serological tests for syphilis are uniformly reactive with yaws, pinta and nonvenereal endemic syphilis. Western blotting (immunoblotting) assays

do not differentiate the antibodies formed in syphilis from those formed in yaws or pinta. Most molecular approaches, such as DNA sequencing, DNA probe analyses and PCR techniques, have also failed to individualize the pathogenic treponemas. Therefore, the clinical appearance of the lesion formed by *T.pallidum* subsp.pertenue, *T.pallidum* subsp.pallidum, *T.pallidum* subsp. endemicum, *T.pallidum* subsp carateum; the anatomical lesion; the mode of transmission; and the age of the individual are the only criteria that can be used to diagnose these infections as separate entities.

Most molecular approaches, such as DNA sequencing, DNA probe analyses and PCR techniques, have also failed to individualize the pathogenic treponemas.

Broadly, serological tests are divided into two categories i.e.

1. Treponemal tests

By these tests specific antibodies to different treponemal antigens are estimated in patients' sera. Being highly specific these tests are used for confirmation of diagnosis.

Some of the commonly used treponemal tests are:

- a) TPHA (Treponema pallidum Haemagglutination) tests
- b) TPI (Treponema pallidum Immobilisation) test
- c) FTA-ABS (Fluorescent Treponemal Antibody Absorption) tests.

Out of these TPHA test has gained wide acceptance due to low cost, ease of performance etc. Accordingly, TPHA test has been used in the programme for life even if yaws has been adequately treated. Therefore, it cannot be used to monitor the treatment of yaws.

2. Non-treponemal tests (Reaginic antibody tests)

These are based on estimation of non-treponemal (anti-cardiolipin) antibodies/reaginic antibodies in the patient sera. These tests have been widely used as screening tests because of very low cost, ease of performing the test even in field

situations not needing any elaborate equipment and still being quite specific and sensitive. A variety of assay systems are available i.e. VDRL (Venereal disease research laboratory) test, RPR (Rapid plasma reagin) card test, TRUST (Toliridine red unheated serum test) etc.

Of all serological tests, RPR test has found wider acceptance because of ease of use and being least technically demanding.

Of all serological tests, RPR test has found wider acceptance because of ease of use and being least technically demanding. RPR test is a rapid slide agglutination based test for antibody detection using carbon coated cardiolipin antigen. Briefly, one drop (50 µl.) of patients serum or plasma is mixed with 15 µl of antigen on a solid card, clumping of grayish black particles within 45 minutes indicates a positive test. The test can be performed qualitatively as well as quantitatively.

Non-treponemal tests also lack sensitivity in late stage infection and screening with a non-treponemal test alone may also yield false positive reactions in various acute and chronic conditions in the absence of treponemal infection (biological false positive reactions). The overall BFP rate is about 1-2 percent (rate in <5 year old age group not traceable in literature), however, it is expected to be slightly on the higher side towards the extremes of ages: high levels of rheumatoid factor in very young and emergence of autoimmune antibodies along with normal ageing process. BFPs may be particularly relevant in our context, as the yaws endemic areas are also endemic for other chronic infectious diseases like malaria (Table 1).

Table 1
Causes of false positive reactions in the non-treponemal tests

Acute conditions	Chronic conditions
Hepatitis	Connective tissue disorders
Viral pneumonia	Immunoglobulin abnormalities
Measles	Narcotic addiction
Malaria	Ageing
Pregnancy	Leprosy

Acute conditions	Chronic conditions
Infectious mononucleous	Malignancy
Chickenpox	
Other viral infections	
Immunizations	
Laboratory or technical errors	

Laboratory tests in the Yaws Eradication programme

- **In the Field**

The Rapid card Reagin test (RPR) is an easy to carry, economical test which can be performed on a drop of blood collected from finger tip and is recommended for use for

1. Supporting clinical diagnosis in cases with doubtful clinical features
2. Undertaking serological surveys

- **District laboratory**

A district laboratory in a yaws affected area should be equipped with a dark ground microscope to confirm the presence of treponemes in the lesions in cases where either clinical features are not diagnostic or where treatment has not brought about any remission in the disease.



- **Regional/Referral laboratory**

A well equipped laboratory in the yaws infected area should be designated as the regional or reference laboratory with facilities for performing dark ground microscopy, nontreponemal reaginic tests as well as treponemal tests such as FTA-ABS for providing confirmatory laboratory diagnostic support to the YEP, training field staff and ensuring quality in the laboratory tests undertaken by the intermediate and peripheral laboratories.

Sero surveillance

As is evident from the tables given above that sero surveillance is a good indicator of active yaws cases in the community. As per programme strategy, sera samples obtained from children of under 5 years of age will be subjected to RPR tests using the finger/heel prick sample as described below:

Table 2

Need for sero surveillance in yaws

% active cases	% sero-reactors
1-2	8.5
11-15	54.0
16-20	71.0
23-30	77.5

Collection of plasma sample for sero surveillance

Microcentrifuge tube (MC) method

1. Using aseptic technique, give either a finger or heel prick
2. Press the finger below the pricked area to express blood
3. Take 0.2 ml/ 0.5 ml capacity MC tube containing a small quantity of EDTA
4. Collect the drops of blood in MC tubes till these are 3/4 th full
5. Allow proper mixing of blood with EDTA by gentle rolling of tubes
6. Separate plasma by centrifuging tubes in a microcentrifuge at 1000-1500 rpm for 35 mts
7. Alternatively allow MC tubes to stand at RT for 3-4 hours to let plasma separate.

5

Treatment

In pre-antibiotic era, yaws (non-venereal treponematoses) were treated with arsenicals, bismuth and application of remedies containing rust and lime juice. Penicillin was established as an effective treatment of treponematoses in the 1940s. The mass treatment campaigns of 1950s and 1960s used procaine penicillin in 2 percent aluminium monostearate. Current treatment modalities with benzathine penicillin were recommended by WHO Scientific Group in 1980. Once injected, penicillin begins to kill the treponemes within minutes and the lesion become non-infectious within 18-24 hours.

Table 3

Recommended dosages of drugs used in Yaws Eradication Program

Age	Drug	Dose	Route	Duration
< 10 yrs	Benzathine benzyl penicillin	0.6 million units	IM	Single dose
> 10 yrs	Benzathine benzyl penicillin	1.2 million units	IM	Single dose
< 8 yrs	Erythromycin*	30 mg/ Kg body wt. in four divided doses daily	Oral	15 days
8-15 yrs	Tetracycline* or Erythromycin*	250 mg four times daily	Oral	15 days
> 15 yrs	Tetracycline* or Erythromycin*	500 mg four times daily	Oral	15 days

- *Tetracycline or erythromycin are given to patients allergic to penicillin. Tetracycline is not given to pregnant and lactating mothers and children below 8 years*

The efficacy of virtually every new antibiotic introduced has been compromised by the emergence of resistant organism; however, despite the wide-spread use of penicillin, no resistant strains of *T.pallidum pertenue* have as yet been reported. But, it has been warned that the experience with *N.gonorrhoeae* and *Streptococcus*, in which penicillin resistance developed suddenly after decades of exquisite sensitivity, may be repeated with the treponemes.

6

Yaws in the World and Region

Disease scenario

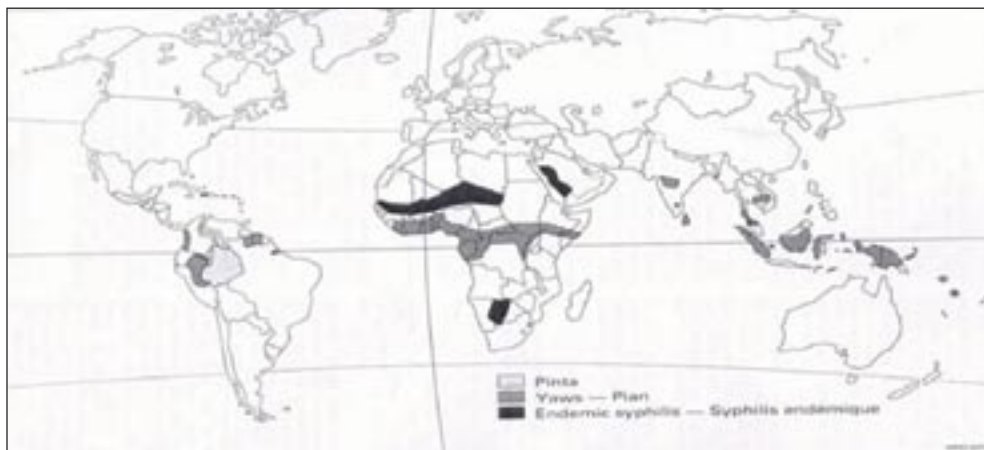
Global including South East Asia region

Yaws affected some 50 million people world-wide in 1948. Reports published subsequently suggest presence of yaws in many parts of the world viz. South East Asia (India, Indonesia, Timor Leste, Thailand, Sri Lanka), Western Pacific (Solomon Island, Papua New Guinea), Africa (Congo, Ghana, Ivory Coast, Togo). PAHO (Haiti, Ecuador) etc.

In 1949-50, national yaws-control campaigns with WHO and UNICEF collaboration were started in Haiti, Indonesia, the Philippines, and Thailand. In 1952, the First International Symposium on Yaws Control was organized at Bangkok. A classification of yaws lesions into nine groups was outlined in the symposium. International Conference on Yaws Control was organized at Enugu, Nigeria in 1955 in which nomenclature of lesions was changed as early and late yaws.

Figure 5

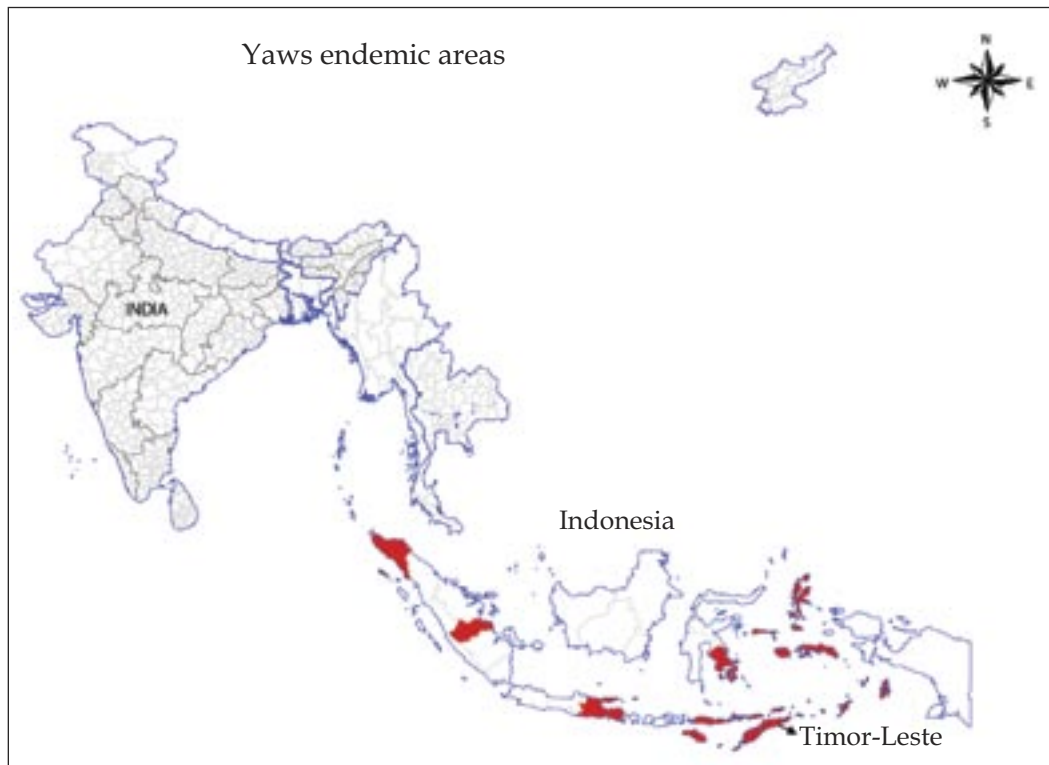
Geographical distribution of the endemic Treponematoses in the early 1990s



XXXIII World Health Assembly in 1980 and subsequent expert group meeting at Fogarty International Center culminated in the decision that measles, poliomyelitis and yaws were clearly suitable for at least regional eradication.

Figure 6

Geographical distribution of yaws in SEA region during 2006



An Inter-country Workshop on Yaws Eradication in South East Asia Region was held at Bali, Indonesia, from 19th - 21st July 2006 to Review the progress of yaws eradication in the region, identify constraints and possible solutions, finalize the regional strategic plan and develop the framework for country-specific plan of action, identify mechanism for resource mobilization. As per presentation made by the country representatives, Indonesia had about 4000 reported cases of yaws during 2004 - 2005 from 8 of the 30 provinces and in Timor Leste, yaws is endemic in 6 of the 13 districts.

7

Yaws in India

Yaws was first noticed in India during 1887 among tea plantation workers in Cachar district of Assam. Yaws was endemic in several parts of the country during 1940s in geographically contiguous area in central India which included Sarguja, Bastar & Bilaspur districts of Chattisgarh state, as well as Mirzapur of Uttar Pradesh, Palamu of Bihar (Now part of Jharkhand state). However, it had dramatically declined world-wide including in India by 1965. The decline was also observed by WHO Consultant who visited the yaws affected districts of Maharashtra during 1966-67.

As per available records, the disease has been reported from 10 states of the country viz., Andhra Pradesh, Assam, Chhattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Orissa, Tamil Nadu, and Uttar Pradesh. The problem is perpetuating in remote, inaccessible, hilly and forest tribal areas.



In India, the disease is mostly known by the name of the tribe affected most in that region. Some of the common names of yaws are as under:

1. Madhya Pradesh	Gondi rog, Maria rog, Shevaya, Aparas, Chakawer
2. Maharashtra	Madia rogam
3. Andhra Pradesh	Koya Rogam
4. Orissa	Koya rog, Bhata phuta, Sabaya
5. Tamil Nadu	Peekali mariyerha, Urubai kilangomariyerha
6. Uttar Pradesh	Vyadhi, Dakhinia
7. Assam	Domaru Khahu, Pachwari

In India, efforts at yaws control can be described in three phases; during 1952-1964, 1965-1995 and since launching of Yaws Eradication Programme (YEP) in India in 1996 to the present.

Penicillin was used as an effective tool for yaws control for the first time during late 1940s. WHO assisted the anti-yaws campaign during 1950s in the world and India.

Phase I (1952-1964)

Penicillin was used as an effective tool for yaws control for the first time during late 1940s. WHO assisted the anti-yaws campaign during 1950s in the world and India. The main drug for use in the program, Penicillin aluminium monostearate, was supplied by the organization. UNICEF provided some of the hygiene requisites like soap. In India, the programme was in operation from 1952 to 1964, and was implemented in the States of Orissa, Madhya Pradesh, Maharashtra, Andhra Pradesh and Madras (now Tamil Nadu). The strategies adopted were; house-to-house survey in the villages to identify cases followed by selective mass treatment of all cases, their household and other contacts with a single injection of PAM (Penicillin G in oil with 2 percent aluminium monostearate). Reportedly, about 0.2 million cases were detected from these states. During 1952, in the states of Orissa, Madhya Pradesh and Andhra Pradesh, 556 Villages were surveyed, 79,813 persons were examined and 3789 (5.6 percent)

cases detected. In Koraput district of Orissa, the incidence rate was brought down to less than 1 percent from 6.6-14.6 percent. In Bastar district, the prevalence rate came down to 1.4 percent from 5.3 percent of the initial survey. It was thought that, the remaining infection could be controlled by governmental health services and hence, active anti-yaws activities were abandoned.

Table-4
Summary report of yaws campaigns in India, 1952-1964.

		Andhra Pradesh	Madhya Pradesh	Maharashtra	Orissa
1	Districts covered	8	5	1	13
2	Teams employed	8	5	3	2 for 8 yrs
		(each for 5 yrs)	(each for 6 yrs)	(each for 4 yrs)	9 for 9 yrs
3	Population at risk	1,643,854	2,104,126	759,146	3,323,383
4	Persons examined	1,045,839	1,256,995	728,871	3,293,312
5	Cases found	60,736	72,584	585	14,604*
6	Case rate (%)	5.8	5.8	0.1	0.4
7	Infectious cases	6,472	Not available	261	Not available
		(10%)		(40%)	
8	1965 survey of yaws prevalence	0.3%	1.0%	Not known	1.1% **** (in 2 highly endemic districts)
9	(WHO) findings (1966-67)	Case in 2 Districts	Not** known	No cases*** observed	Not known

* Age-Sex distribution of 14,604 cases:

Age	Male	Female
<14	5,907 (61.1%)	3,754 (38.9%)
14+	2,044 (41.4%)	2,899 (58.6%)

** Bastar District recorded over 10% prevalence before the campaign.

*** In a district of 1.2 million population, the campaign was abandoned as disease prevalence found insufficient to warrant further efforts.

**** These districts recorded 14.6% and 6.6% prevalence before the campaign.

Phase II (1965-1995)

Following yaws resurgence in Madhya Pradesh during 1977, National Institute of Communicable Diseases (NICD) undertook a rapid survey in some of the states to assess the situation. A total of 18,196 individuals from three districts of Orissa, one district of erstwhile Madhya Pradesh, Maharashtra, Andhra Pradesh were examined and twenty-six cases were detected, six of them serologically positive, indicating continuing yaws transmission in some areas of the country (Table 5).

Table 5

Yaws situation in 1981

State	District	Individuals examined	No. of cases detected	Laboratory samples tested and positive	
Orissa	Phulbani,	3026	8	14	1
	Koraput,	4730	4	-	-
	Mayurbhanj	2997	7	-	-
Madhya Pradesh	Bastar*	6121	0	-	-
Maharashtra	Chandrapur	692	2**	-	-
Andhra Pradesh	Khammam	630	5	5	5

*now part of Chattisgarh state and divided into three districts.

** Two old cases were detected and both were serologically positive

Another attempt was made during 1983-85 to determine the status of yaws disease as well as its control by collecting information through a questionnaire method in the country. Diagnosis of yaws case was based on clinical findings. Information was collected from all states and Union Territories, which prior to 1950s had been endemic for yaws. The response rate was 76 per cent (93 out of 123 districts). A total of 1,349 cases were reported from Andhra Pradesh (3 districts), erstwhile Madhya Pradesh (1 district) and Orissa (6 districts). There was no report of yaws cases in Assam during 1984-1986 (Table 6). Four Anti-yaws Teams were constituted in the states of Maharashtra, Orissa, Andhra Pradesh and Tamil Nadu.

Table 6

Yaws situation during 1983 - 1985

State	District	1983	1984	1985 (June)
Andhra Pradesh	Khammam	101	60	38
	Vizianagaram	143	196	161
	West Godavari	0	0	4
Madhya Pradesh	Bastar*	39	55	32
Orissa	Keonjhar	NR	42	34
	Mayurbhanj	49	NR	NR
	Dhenkanal	13	10	NR
	Phulbani	12	18	2
	Balasore	0	13	0
	Koraput	231	28	78
Total cases= 1349		588	422	339

Though there were no centralized efforts at yaws control, several states continued the program on their own. Anti-yaws team deployed earlier continued to work. But, due to poor importance accorded to the program, not much work was done during the period.

Phase III (1997 to the present)

This part is covered in the next chapter.

8

From Yaws Control to Yaws Elimination

Genesis of Yaws Eradication Programme

In the 1950s a mass campaign for treatment of cases and contacts with mass administration of penicillin was launched with assistance from WHO and UNICEF. This resulted in a marked reduction of yaws cases in India and the disease prevalence came down from 14.0 percent to below 0.1 percent in many areas.

Inspired by the success of smallpox eradication in 1977, a proposal for eradication of guinea worm disease and yaws was proposed as early as 1974 by the then Director, NICD. Success of Guinea Worm Eradication Programme (GWEP) gave a further boost to the programme managers to aggressively pursue the proposal of yaws eradication.

During 1984, NICD collected data on yaws situation in India through information collected from different states, which was submitted in response to questionnaire circulated to these states. On the basis of the information thus gathered, it was opined that, yaws was localized in only few states and its eradication is possible.

Inspired by the success of smallpox eradication in 1977, a proposal for eradication of guinea worm disease and yaws was proposed as early as 1974.

A “Workshop on Yaws Eradication’ convened at the National Institute of Communicable Diseases (NICD), Delhi from 19-22 January 1987 discussed the feasibility of yaws eradication from the country and formulated strategies for the same. The approaches for eradication were deliberated upon and it was resolved that a national programme directed towards interruption of disease transmission in the affected states and ultimately its eradication from the country be initiated. Accordingly in 1995, NICD prepared a project document on “Yaws Eradication Programme” (YEP) in India and submitted to Government of India. YEP gained added advantage as

Tribal Welfare is a national priority under Article 275 (1) of the Constitution of India, the “International Decade of World’s Indigenous People” (1995-2004) and the national motto of “Health for All and in particular for Underprivileged (HFU)”

Yaws Eradication Programme (YEP)

Government of India approved Yaws Eradication Programme as a central sector health scheme as a Pilot Project in undivided Koraput district, Orissa during the year 1996-97. Based on the experiences and lessons learnt from the pilot project, it was decided to extend the activities as a programme to cover all the endemic states in March 1999.

The **objectives** of the programme are to achieve:

- 1) Cessation of transmission of Yaws in the country (defined as nil reporting of new yaws case), and
- 2) Eradication of Yaws defined as absence of new cases for a continuous period of three years, supported by absence of evidence of transmission through sero-survey among under-five children (i.e. no sero reactivity to RPR/VDRL in < 5 yr children).

The National Health Policy 2002 set the target of Yaws Eradication by 2005. The same was revised because cases were reported in 2003 and as per the definition of yaws eradication; nil reporting has to be maintained for a continuous period of three years. Therefore, the process of certification of eradication could have been started latest by 2007, hence it was agreed that elimination could be achieved first and then the same status could be maintained for three years before embarking for declaration of eradication.

The Programme strategy

The programme strategy adopted to achieve the stated objectives included:

- 1) Creating yaws consciousness and awareness in health professionals and community members
- 2) Trained manpower development,
- 3) Detection and treatment of cases and contacts,

- 4) Monitoring and evaluation, and
- 5) IEC activities harnessing multi-sectoral approach.

Implementation steps

The Yaws Eradication Programme in India is being implemented adopting following steps:

1. Identification of affected areas. Affected areas were identified on the basis of:

- i) Historical data obtained from literature,
- ii) Reports received from state governments,
- iii) Geographical contiguity, and
- iv) Epidemiological evidence.

Additionally, using a survey method of identification of affected areas by eliciting local names of the disease as described in the first chapter was also adopted. A total of 49 districts of ten states were thus identified as the affected areas where YEP is being operationalized (Table 7), (Fig.7).

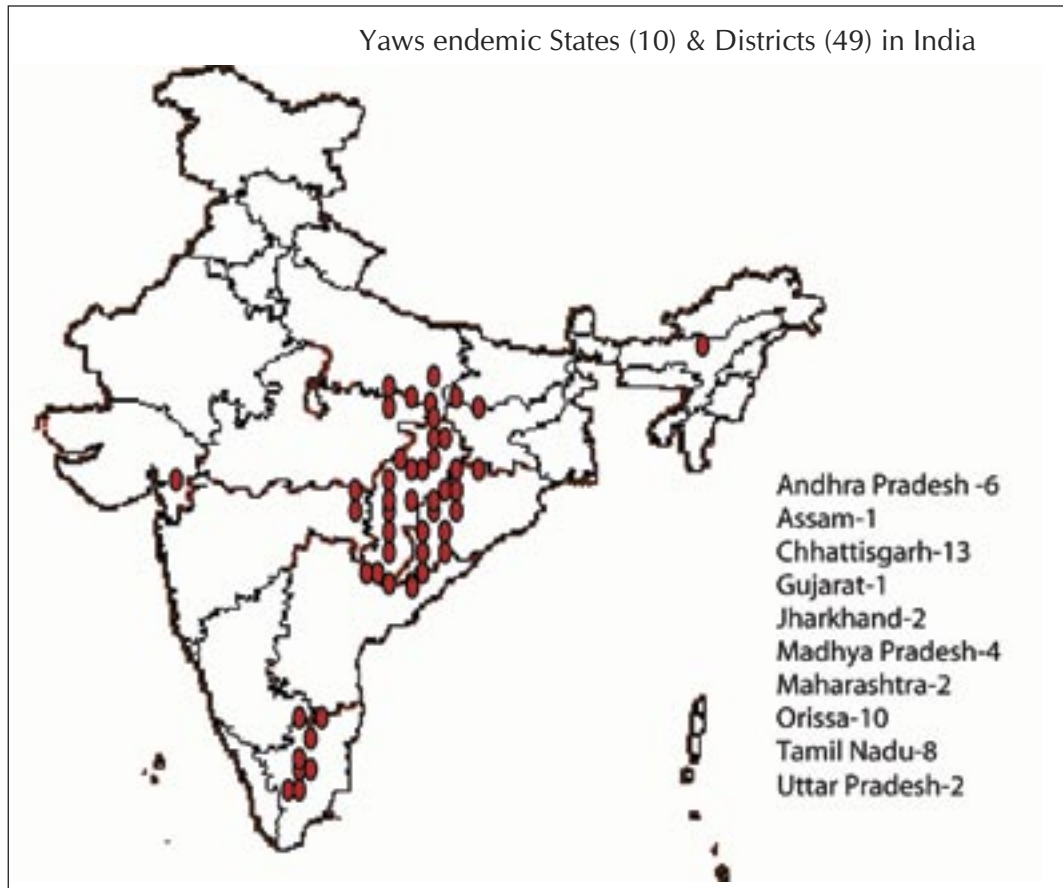
Table 7

List of 49 districts where YEP is being implemented

Name of the State	No. of district	Name of the endemic districts
1. Andhra Pradesh	6	Vizianagaram, Khammam, West Godawari, East Godawari, Warangal, Srikakulam
2. Assam	1	North Cachar Hills
3. Chhattisgarh	13	Bastar, Kanker, Dantewara, Raipur, Surguja, Dhamtari, Mahasamund, Bilaspur, Zanzgir (Champa), Korba, Korla (Bainkatpur), Raigarh, Jaspur
4. Gujarat	1	Ahwa Dang
5. Jharkhand	2	Palamau, Garhwa
6. Madhya Pradesh	4	Sidhi, Rewa, Shahdol, Umariya
7. Maharashtra	2	Gadchirolli, Chandrapur
8. Orissa	10	Koraput, Malkangiri, Nabrangpur, Rayagada, Kandhamal, Kalahandi, Mayurbhanj, Keonjhar, Dhenkanal, Balasore
9. Tamil Nadu	8	Kallakurichi, Dharmapuri, Salem, Karur, Dindigul, Palani, Theni, Coimbatore
10. Uttar Pradesh	2	Mirzapur, Sonbhadra

Figure 7

Sketch map of India showing yaws endemic districts (one dot represents one district)



2. Programme advocacy

Advocacy is essential for focusing attention on the public health challenge posed by yaws and for resource allocation for the programme. Various fora including CCH&FW and various meetings including other departments like Tribal Welfare were utilized for advocacy and following points were emphasized:

- Disease is eradicable with marginal inputs,
- Availability of cost-effective intervention in form of single injection of benzathine penicillin,
- Will boost the image of health workers and make them more acceptable in the community, and
- Will have collateral advantage.

A training-cum-sensitization workshop was organized at National Institute of Communicable Diseases, Delhi (NICD) inviting officers from states, affected districts, institutions and other voluntary organization in April 1995. Subsequently similar activities were undertaken at state/district level. Advocacy meetings were organized at district headquarters under the Chairmanship of District Collector/District Magistrate inviting representatives from departments like panchayati raj, ICDS, education, tribal welfare, forest, etc.

3. Piloting and expansion of project

As per the decision of the Government of India, piloting was done in undivided district Koraput, Orissa. A meeting of experts was organized at Bhubaneswar, Orissa during 16-18 April 1996 in which experts finalized the strategy, operational and training manuals; and implementation schedules of YEP in Koraput district during 1996-97. Based on the observations of the pilot project, the programme was expanded to cover other endemic areas as per details in Table-8.

A meeting of experts was organized at Bhubaneswar, Orissa during 16-18 April 1996 in which experts finalized the strategy, operational and training manuals; and implementation schedules of YEP in Koraput district during 1996-97.

Table 8

Year-wise states and districts covered under YEP

Year	Number of new states included	Cumulative total no. of states	Number of Districts included	Cumulative number of districts covered
1996-97	1	1	4	4
1997-98	5	6	26	30
1998-99	3	9	12	42
1999-00	1	10	7	49

4. Trained manpower development

Training of medical officers and paramedical staff were given top priority. Faculty of NICD, Delhi were entrusted the task of training the trainers (state/ district level officers). For medical officers a one day and for paramedical half -a day training

programmes were organized. The medical officers were trained by the State Officers as well as by officers of NICD at district headquarters. Expertise available in nearby medical colleges was also utilized for this purpose. The para-medicals and other workers were trained at CHC/PHC. Training materials was prepared at NICD. Before active searches, re-orientation of health personnel is also being organized.

5. Mobilization of community through IEC

All areas identified as yaws-endemic were targeted for community awareness to be present at the time of active search campaigns for detection and treatment of cases and to promote self reporting and availing free treatment at all health facilities. Community awareness was linked to training of staff and availability of service. Use of case recognition cards, posters/bill boards in local languages and messages by word-of-mouth and traditional methods like folk songs etc. were developed and used. Weekly markets/haats in tribal areas is a good opportunity to disseminate the important information for community participation and same is being used under the programme.

Case recognition cards, posters/bill boards in local languages and messages by word-of-mouth and traditional methods like folk songs etc. were developed and used.

6. Detection and treatment of cases and contacts

Cases as per case definition used under the programme are being detected by making house-to-house visits in the affected areas by trained para-medical workers and community level functionaries at frequent intervals. The cases so detected by paramedical workers are then confirmed by Medical Officer. This is the most important component of the programme and is being organized twice in a year of which, one is being organized in post-monsoon period. During active case search, a high level of population coverage (at least 90 percent) is being ensured by IEC and community mobilization so that all cases are detected and treated along with their contacts.

Cases detected during active search are treated simultaneously and immediately after detection along with their contacts. To

facilitate the detection of cases, coloured disease recognition card and other health education materials have been developed.

Due care in form of intra-dermal sensitivity test before giving injection penicillin and availability of emergency drugs to attend any eventuality is part of operational guidelines. Bio-safety measure in form of use of separate syringe and needle and their safe disposal is also ensured.

7. Surveillance

Besides active search campaigns, inter-search surveillance is also being done by routine reporting of cases during the visits of the health workers to villages, cases being reported at the health facilities. Cross notification of cases and migratory population is also being done. This issue was taken care through organizing inter state/district border meetings of concerned officers and review meeting of programme officers. The community is encouraged to report any rumour.

8. Inter-sectoral coordination

It is needless to emphasize that the elimination of yaws needed a close inter-sectoral coordination and collaboration between the health and other departments like tribal development, ICDS, panchayati raj, education, forest, etc. Regular reviews were organized at various levels. Other departments like tribal development helped the programme by distribution of soap and iodised salt to achieve the desired high population coverage. The community level functionaries of other departments helped in identification of the cases. Community oriented activities like Mitanin, Kalajatha in Chattisgarh, distribution of rice to cases to motivate them to receive the injections for the treatment of yaws by Integrated Tribal Development Agency (ITDA) in Andhra Pradesh are worth mentioning examples of inter-sectoral coordination.

The community level functionaries of other departments helped in identification of the cases. Community oriented activities like Mitanin, Kalajatha in Chattisgarh, distribution of rice to cases to motivate them to receive the injections for the treatment of yaws by Integrated Tribal Development Agency (ITDA) in Andhra Pradesh are worth mentioning examples of inter-sectoral coordination.

9. Supportive supervision and monitoring

The programme activities are being monitored by following methods:

- i) Monthly reporting of cases
- ii) Report of active search
- iii) Visit of NICD and central government hospitals officers, state/ district programme officers
- iv) Review meeting of programme officers
- v) Independent Appraisals
- vi) Task Force Meetings under the chairmanship of Director General of Health Services, Government of India. The task force was constituted in April 2000.

10. Sero surveillance

Sero-surveys in under-five children are being undertaken as per the protocol to examine the evidence of transmission.

11. Validation and certification

The disease status is validated by independent appraisals being undertaken from time to time. After achieving the nil case status in the country, the same was validated by a group of experts consisting of dermatologists and public health professionals who visited the areas, interacted with the programme officers, health personnel and community members. Their observations were examined by a group of experts. The same exercise is proposed to be undertaken annually for three years. If zero status is maintained for 3 years, then the process of certification of eradication would be initiated.

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Programme management

- The National Institute of Communicable Diseases (NICD), Delhi is the nodal agency, identified by Government of India, for planning, guidance, co-ordination, monitoring and evaluation of the programme. Funding in the form of grant-in-aid from the central government is routed through

nodal agency. For monitoring and evaluation, nodal agency coordinates appraisal of the programme by independent experts, review the programme through review meeting of state programme officers, carry out sero surveillance among under-five children and at top level Task Force under the chairmanship of DGHS review the programme from time to time. The nodal agency also helps state governments in diagnosing suspected cases through field investigation or by senior level dermatologists/clinicians.

- The programme is implemented by the State Health Directorates of yaws endemic states utilizing existing health care delivery system with the co-ordination and collaboration of Department of Tribal Welfare and other related departments/institutions. The programme activities were operationalized through general health services rather than through vertical approach.

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Case definition

Initially a very sensitive, simple clinical case definition was used for the health workers under the programme as under:

Any one or more of the following symptoms in a person with a history of residence (present or past) in tribal areas:

- Ulcer with scab
- Bone and joint pains especially during night,
- Palmer/plantar thickening (hyperkeratosis), and
- History of any such lesions during last five years.

Once numbers of cases were brought down to a very few, the above definition was revised as under:

(a) Suspect case

A person with a history of residence (present or past) in yaws endemic areas with any one or more of the following symptoms:

- Ulcer with or without scab on any part of the body,
- Bone and joint pains especially during night,
- Palmar/plantar thickening (hyperkeratosis), and
- History of any such lesions during last five years.

(b) Probable case

A suspect case found positive by RPR test and confirmed by TPHA test. Since there is per se no confirmatory test for Yaws, the probable case will be taken as a case of yaws. Case should be reported as Yaws case only after laboratory confirmation.

Details of the activities undertaken under the programme

Trained manpower development

Initially, the medical officers of the all the districts were trained with support from NICD faculty. About 20-40 medical officers

About 20-40 medical officers per district were trained at district headquarters. The trained medical officers imparted training to paramedical staff in their respective primary health centers. Reorientation training is being organized every year before active search.

per district were trained at district headquarters. The trained medical officers imparted training to paramedical staff in their respective primary health centers. Reorientation training is being organized every year before active search. Besides, health workers, community level functionaries of other departments like ICDS, school teachers, forest guards, and village level workers were also sensitized for detection of yaws cases.

Active search operation

Active search activity is being undertaken as per programme guidelines in the above listed states and districts. The activity is to be organized twice in a year (April to May and October to November) as per guidelines. But because of various reasons like National Immunization Days for polio, public health emergencies (flood, super cyclone), etc. such a guidelines could not be adhered to but at least one active search has been organized in every district since the initiation of programme activity.

The case detection is done by making house to house visits by multipurpose workers and community level functionaries. The search activity has to be completed within two weeks covering the total population. Every effort is being made to have a high level of coverage (at least 90 percent) during active search operations.



A total of 6744 cases and approximately 10 contacts per case were treated with injection Benzathine penicillin. Not a single case of penicillin hypersensitivity was reported.

Review meeting of programme officers was held at Bhopal on 25-26 February 1999. The second and third review meetings were held during 24-25 May 2001 at Nagpur and 4-5 April 2003 at Hyderabad respectively. The fourth Review Meeting was held at NICD Delhi during 29-30 September 2005.



The programme activities were reviewed and further activity under YEP was recommended. Special emphasis was given to timely submission of Statement of Expenditure (SOE) & Utilization Certificates (UC), maintaining of good quality active search, strengthening IEC activities and proper record keeping at all levels.

Multi-sectoral meetings on the programme were held at NICD, Delhi on 23-24 December 1999 and at Bilaspur on 25-26 February 2000. The meeting was attended by a senior officer of Union Ministry of Tribal Affairs, project officer of Integrated Tribal Development Agency (ITDA) and state and district nodal officers. The areas for collaboration and plan of action were discussed.



An inter-state border meeting of YEP programme officers of contiguous bordering districts of Andhra Pradesh, Chattisgarh, Maharashtra and Orissa was held at Bhadrachalam, district Khammam (Andhra Pradesh) on 29.10.2005. The venue was chosen because of its strategic location in border area. District Khammam is bordering Dantewara district

of Chattisgarh, Malkangiri district of Orissa and is close to Gadchiroli district of Maharashtra. Besides officers from nodal and state HQ, thirty district/PHC level programme officers took part in the meeting. Similar meeting was organized at Jagdalpur, Chattisgarh.

Appraisal of the programme: Under the programme guidelines, the progress of the programme activities is being monitored through Appraisal by independent experts. Till April 2006, the programme activities were monitored four times by a team of independent experts. The Schedule is as follows:



First independent appraisal: 24 April to 03 May 2000 Second independent appraisal : 18-27 February, 2002 Third independent appraisal : January 24th to February 5, 2004 Fourth independent appraisal : 19-27 December 2005 in Andhra Pradesh, Chattisgarh; and April 2006 in Orissa and Maharashtra.

The independent expert's team during 3rd and 4th appraisal could not find any early case of yaws. The teams also expressed satisfaction at the activities undertaken by different states under YEP. However, as per the observations and recommendations of the experts, follow-up actions are being undertaken. As part of the same activity, two officers from nodal office visited Rayagada district, Orissa and Garhwa district of Jharkhand during the month of March 2006.

The two teams collected more than 150 sera samples from <5 children for RPR test. All the samples were found negative.

As per the observations and recommendations of the experts, follow-up actions are being undertaken. As part of the same activity, two officers from nodal office visited Rayagada district, Orissa and Garhwa district of Jharkhand during the month of March 2006. The two teams collected more than 150 sera samples from <5 children for RPR test.

A **task force** was constituted under the Chairmanship of Director General of Health Services, Government of India in April 2000 to review the progress made in the implementation of the Programme and to suggest changes in the strategies, if any.

In the second meeting of the task force held on 23 October, 2001, the progress made in implementation was reviewed and steps to further strengthen it were discussed. The task force recommended constitution of a sub-group on sero surveillance to work out modalities for carrying out sero surveillance for yaws. The sub-group was accordingly constituted and it has given its recommendations and actions are being taken accordingly.

The present strategy of the programme was reviewed and it was suggested that it may be continued. It was also resolved that efforts (timely search, detection and treatment of cases and contacts, extensive IEC for creating awareness in the community, achieving high coverage during active search) for eradication of yaws need to be intensified.

The third meeting of the task force was held on the 9th July, 2002 at New Delhi. The present strategy of the programme was reviewed and it was suggested that it may be continued. It was also resolved that efforts (timely search, detection and treatment of cases and contacts, extensive IEC for creating awareness in the community, achieving high coverage during active search) for eradication of yaws need to be intensified. The task force reviewed the programme and was satisfied with the progress of programme implemented.

The fourth meeting of Task Force was held 26.07.05 at New Delhi. A Total of 26 experts took part in the meeting. Important recommendations included:

- Case definition was revised to include laboratory component.
- Methodology and protocol for sero surveillance among <5 children was approved
- Synchronized active case search is to be carried out in all the states under YEP

Table 9

(Case trend) Year-wise reported number of cases of yaws from 1996-2006 (August)

States	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006 @
Andhra Pradesh	223	249	338	339	442	152	135	6	0	0	0
Chattishgarh	NA	71	170	40	38	12	0	0	0	0	0
Orissa	3348	379	111	82	124	137	145	40	0	0	0
Maharashtra	NA	0	48	0	1	0	0	0	0	0	0
Gujarat	NA	36	0	2	17	8	0	0	0	0	0
Tamil Nadu	NA	0	0	0	34	0	0	0	0	0	0
Uttar Pradesh	NA	0	0	0	1	0	0	0	0	0	0
Assam	NA	NA	NA	4	7	4	1	0	0	0	0
Madhya Pradesh	NA	NA	NA	NA	0	0	0	0	0	0	0
Jharkhand	NA	NA	NA	NA	0	0	0	0	0	0	0
Total	3571	735	667	467	664	313	281	46	0	0	0

NA: Not available

Figure 8

Number of reported yaws cases from 1996 to 2006

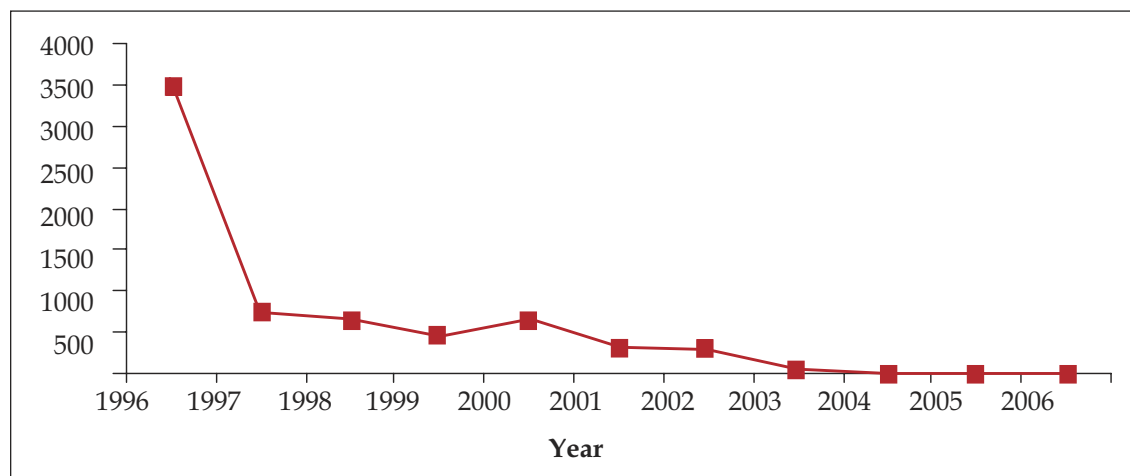


Table 10
State and district wise yaws cases 1996-2006

1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006**
Andhra Pradesh										
Khammam	205	177	284	147	274	31	44	0	0	0
West Godawari	0	8	40	87	93	100	21	0	0	0
Vizianagaram	18	64	14	105	75	21	70	6	0	0
Total	223	249	338	339	442	152	135	6	0	0
Assam										
North Cachar Hills	NA	NA	NA	4	7	4	1	0	0	0
Total	NA	NA	NA	4	7	4	1	0	0	0
Chattisgarh										
Bastar	NA	26	142	35	35	10	0	0	0	0
Raipur	NA	45	28	5	3	0	0	0	0	0
Dantewara	NA	0	0	0	0	2	0	0	0	0
Total	NA	71	170	40	38	12	0	0	0	0
Orissa										
Koraput	3,348*	55	10	20	38	0	5	0	0	0
Rayagada	NA	38	101	11	17	0	16	0	0	0
Malkangiri	NA	155	0	0	0	0	0	0	0	0
Nabrangpur	NA	131	0	51	0	0	0	0	0	0
Mayurbhanj	NA	0	0	0	27	116	117	40	0	0

Kandhamal	NA	0	0	0	27	19	7	0	0	0	0
Kalahandi	NA	0	0	0	15	0	0	0	0	0	0
Keonjhar	NA	0	0	0	0	2	0	0	0	0	0
Total	3348	379	111	82	124	137	145	40	0	0	0
Maharashtra											
Gadchiroli	NA	NA	48	0	1	0	0	0	0	0	0
Total	NA	NA	48	0	1	0	0	0	0	0	0

Gujarat

Ahwa-Dang	NA	36	0	2	17	8	0	0	0	0	0
Total	NA	36	0	2	17	8	0	0	0	0	0

Tamil Nadu

Kallakurichi	NA	NA	NA	NA	34	0	0	0	0	0	0
Total	NA	NA	NA	NA	34	0	0	0	0	0	0

Uttar Pradesh

Sonbhadra	NA	NA	NA	NA	1	0	0	0	0	0	0
Total	NA	NA	NA	NA	1	0	0	0	0	0	0
Grand Total	3,751	735	667	467	664	313	281	46	0	0	0

* Suspected cases

NA- Information not available as programme was not in operation The districts not shown here but covered under the programme reported zero case all through out.

**Till August

Figure 9

Showing proportion of yaws cases contributed by different states since the start of YEP

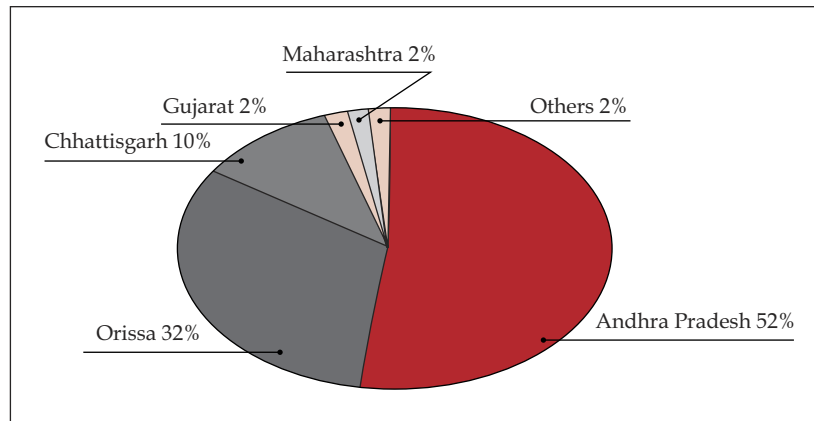


Figure 10

Showing year-wise population at risk and reported cases

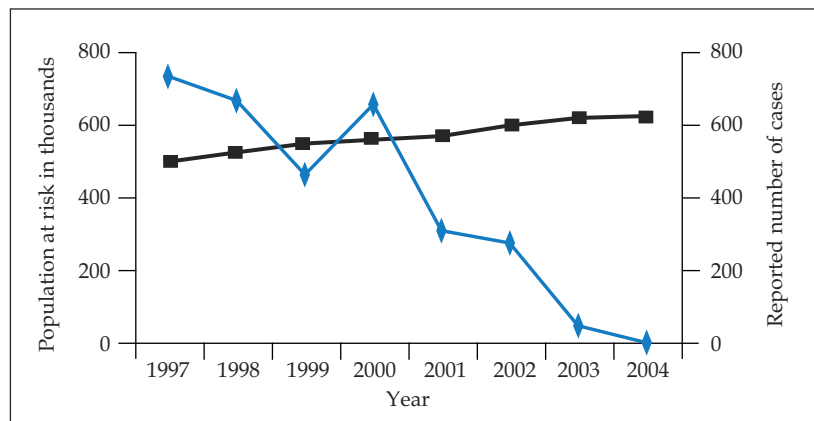


Fig. 10 describes the year-wise population at risk and number of reported cases for the corresponding year. At risk population was calculated on the basis of total population, either actual or estimated population, of the surveyed districts. During 1981 and 1984, the prevalence rate was 0.0002 percent and 0.0024 percent, respectively. In comparison, the rate for 1997 and 2001 was 0.0012 and 0.0004 percent, respectively.

Had YEP not been in operation, the corresponding figure for 1997 and 2001 would have been 1,464 and 1,758 respectively,

taking 0.0024 percent prevalence rate for 1984. Although, influence of other factors, viz., ever improving health service delivery system, increased education level, improved road communication, easily available treatment modalities etc. might have some effect on the overall decline of yaws cases, the effect of YEP could not be overlooked.

Sero surveillance

As per programme guidelines, sero-surveys in under-five children have to be undertaken to know the status of transmission.

During the second meeting of the Task Force on Yaws Eradication Programme (YEP), it was decided to constitute a sub-group consisting of experts from following organizations to develop a protocol for the sero surveillance under the programme: (a)ICMR, (b) AIIMS, New Delhi (c) Safdarjang Hospital, New Delhi (d)RML Hospital, New Delhi (e) NICD, Delhi and (f)State representatives.

It was decided that the protocol should cover following:

- 1) Sampling design (sample size & selection procedure),
- 2) Type of serological test and logistics requirement,
- 3) Guidelines to collect blood, its transportation & training of health personnel,
- 4) Quality control of diagnostic kits and identification of regional laboratory.

Above issues were deliberated in two meetings and guidelines for sero surveillance are as under:

Sample size and design

Sample size was computed as 5662 for $p = 0.001$ (considering it as close to zero), 80 percent power, α of 0.05.

A district has been taken as one sampling unit. As the sample has to be drawn from all the districts covered under the programme, the above sample size was divided by 49 (no. of districts where YEP is being operationalized). Hence, about 150

under five children have to be covered per district as the sample population. The selection of villages has to be done on the basis of following criteria:

- 1) Villages from where cases have been reported in recent past or otherwise.
- 2) Approachableness of the area- difficult to reach villages defined as under:
Villages situated at >5 kms from motorable roadhead in plain area or >3 kms in hilly area.
- 3) Villages having poor immunization coverage- measles vaccine coverage of less than 50 percent has been suggested as a proxy indicator of poor health care delivery in the village.

Type of blood sample

Blood sample will be collected from heel/finger prick method from under-five children in two different containers (Eppendorf tube with EDTA). Sterile disposable lancets will be used for blood collection and bio-safety measures will be ensured.

Type of test

RPR card test will be used to find out the sero-reactivity to treponema among the <5 children, as this test is suitable due to easy availability and field friendliness. All positive cases will be revalidated by TPHA test for confirmation.

Quality control

Quality control will be assured by testing randomly selected 5 per cent positive and 10 percent negative samples at NICD, Delhi.

To examine the field level feasibility of the methodologies for sero surveillance, NICD carried out sero surveillance in different states. The result is shown below. A total of 3831 samples were tested, of which 1.54 percent was found positive by RPR, but none found positive by TPHA test.

The sero surveillance as per protocol has to be continued on yearly basis.

Table 11

Results of sera samples tested from under-five children

State	District	Sample tested	Number Positive		No / % +ve by TPHA
			By RPR	% positivity	
1. Uttar Pradesh	1. Mirzapur	164	0	0	ND
	2. Sonbhadra	164	0	0	ND
2. Gujarat	3. Ahwa Dang	232	0	0	ND
3. Andhra Pradesh	4. Khammam	159	3	1.8	0 / 0
	5. E.Godawari	160	0	0	ND
	6. W.Godawari	160	0	0	ND
	7. Vizianagaram	150	0	0	ND
4. Tamil Nadu	8. Srikakulam	154	0	0	ND
	9. Dharampuri	100	0	0	ND
	10. Kallakurchi	96	0	0	ND
5. Chattisgarh	11. Namakkal	85	0	0	ND
	12. Jadgalpur. 13. Dantewada, 14. Dhamtari	743	22	2.96	0 / 0
	15. Korba, 16. Koriya, 17. Janjgir, 18. Raipur, 19. Raigarh	985	32	3.2	0 / 0
6. Orissa	20. Malkangiri	105	1	0.95	ND
	21. Nawrangpur	55	0	0	ND
7. Jharkhand	22. Garwah, 23. Palamu	102	1	0.98	0 / 0
8. Maharashtra	24. Gadchirolli	161	0	0	ND
9. Madhya Pradesh	25. Shahdol	56	0	0	ND
	Total	3831	59	1.54	0

9

How Yaws was Eliminated

Declaration of Yaws Elimination

India reached “Nil” yaws case status during 2004, and as per the programme guidelines was to be validated before the formal declaration of yaws elimination. This issue was discussed in the third Task Force meeting during 2005 which observed that with the current case definition under the programme, it will not be possible to substantiate “Nil” case status as the case definition is very sensitive risking over reporting. The Task Force revised the case definition incorporating the laboratory component. It also suggested that case should be reported as Yaws case only after laboratory confirmation.

The Task Force revised the case definition incorporating the laboratory component. It also suggested that case should be reported as yaws case only after laboratory confirmation.

It further recommended that a synchronized yaws active case search should be carried out in all the states under YEP from 17th to 26th October 2005, with the revised case definition. If the “Nil” status validated by the subsequent independent appraisal, Yaws Elimination could be declared.

Accordingly, the revised case definition was circulated to all the states under YEP advising them to undertake active case search using revised case definition. As per the reports received from the states of subsequent post monsoon yaws case search, no early case was reported.

Following this, the Independent Appraisal of YEP was undertaken and visited different areas and confirmed nil yaws case status as reported by the states. In view of this fact an expert group was constituted to discuss the status of Yaws Elimination on 25.04.2006 at NICD, Delhi. The Expert Group deliberated and based on the review of the programme

activities, report of the independent appraisals, interaction with the experts and result of laboratory samples tested at NICD laboratory, the expert group felt that yaws elimination can be declared.

Following the recommendations of the expert group, a meeting of Task Force was held on 31.05.2006 under the Chairmanship of Director General of Health Services, which accepted the recommendation of the Expert Group to “Declare Elimination of Yaws from India”.

Attributes to success in India

Political commitment - NHP 2002 statement

The success of any public health programme, particularly programme aimed at elimination or eradication depends on high political commitment and adequate resources. The National Health Policy 2002 statement about the target to achieve Yaws Eradication by 2005 is an indicator of national commitment to get rid of this scourge. This gave an impetus to the programme activities and because of it the programme was reviewed from time to time at the highest level which made it possible to have the adequate resources for the same.

Advocacy

Periodic advocacy meeting with the policy makers, administrators and stakeholders focusing on the availability of a cost-effective intervention in the form of a single injection of long acting penicillin and stressing the fact that the disease is eradicable with marginal inputs paid dividends to the programme.

Vigorous and sustained implementation of the strategies

The active search activity which is one of the most important strategies is being vigorously pursued and every year at least one search in post monsoon period is being organized.

Supportive supervision and focused monitoring

An effective monitoring and supervision mechanism established to support the peripheral workers and review their activities helped to identify the constraints and to take the necessary corrective measures. The supervision is supportive and included on-the-job training. The establishment of a high-level Task Force (TF) under the Chairmanship of Director General of Health Services, Government of India is very useful for advocacy, resource mobilization, undertaking periodic reviews and for monitoring the progress in implementation and to advice on Annual Plans of Action. The TF met at least once a year to give directions to the national programme. A simplified information system integrated with the general public health services developed and is being followed. Prompt action from higher levels especially on the reporting of cases ensured prevention of further spread of infection.

An effective monitoring and supervision mechanism established to support the peripheral workers and review their activities helped to identify the constraints and to take the necessary corrective measures.

Some features of the Yaws Eradication Programme (YEP)

- Govt. of India approved Yaws Eradication Programme as a central sector health scheme as a pilot project for undivided Koraput district, Orissa during the financial year 1996-97. Subsequently, in March 1999, the Standing Finance Committee of Government of India approved extension of the scheme in 49 districts of 10 endemic states. NICD is identified as the nodal agency for the programme.
- The objectives of the programme are:
 - i) Elimination of disease i.e. interruption of the transmission of yaws infection in the country (reporting of no early/infectious case), and
 - ii) Eradication of yaws (i.e. no sero reactivity to RPR/VDRL in <5 year children after three year period of nil reporting of cases).
- The programme strategy includes manpower development, detection of cases by active search, treatment of cases and contacts simultaneously and IEC activities harnessing multisectoral approach. Injection Benzathine penicillin is

the drug of choice given in single dose. In penicillin hyper sensitive cases, erythromycin or tetracycline is used in the recommended doses for a period of 15 days.

- To facilitate the detection of cases, a coloured disease recognition card and other health education materials have been developed.
 - The programme is being implemented by the State Health Directorate of yaws endemic states utilizing existing health care delivery system with the co-ordination and collaboration of Department of Tribal Welfare and other related institutions. Active search for yaws cases is being done at least once in a year preferably in post monsoon period by the trained health workers under the supervision of medical officers. Besides active search, routine surveillance through peripheral health institutions and health workers, surveillance in weekly markets in tribal areas is also being done.
- a. The programme is being monitored by the reports, visit of NICD officers to yaws affected areas, review meeting of programme officers, inter-state border meeting, independent appraisals of the programme being undertaken from time to time. So far four appraisals has been done in Feb. 2000, April 2002, Feb. 2004 and Dec. 2005 (Annex- 1,2,3,4)
 - b. A Task Force constituted under the Chairmanship of Director General of Health Services, Government of India in April 2000 reviewed and suggested the changes in the strategy, if any. Experts from Dte.GHS, WHO, ICMR, central government hospitals, CHEB, NICD, Union Ministry of Tribal Affairs and state health directorates of Orissa, Andhra Pradesh, Chattisgarh and Maharashtra are the members of the task force. So far four meeting of the task force have been organized (18.08.2000, 23.10.2001, 19.07.2002 and 26.07.2005)
 - c. The success of the programme is evident from the fact that the number of reported cases has come down from more than 3500 in 1996 to nil case in 2004. Since then no new early/infectious case has been reported.

Active search for yaws cases is being done at least once in a year preferably in post monsoon period by the trained health workers under the supervision of medical officers.

- d. National Health Policy document 2002 has envisaged yaws eradication by 2005. The issue of target date was deliberated at NICD and considering the fact that cases were reported in Dec. 2003 and three year period of nil cases is required before initiation of eradication process, Director NICD took up the matter with the Ministry of H&FW, Govt. of India in 2004 and then Secretary (Health) reviewed the programme on 10.09.2004 and it was agreed upon that target date of eradication be revised.
- e. An expert group meeting was held on 20.04.2006 under the Chairmanship of Dr. S. Pattanayak, Former Regional Advisor, SEARO/WHO to discuss the status of elimination. Subsequently, 5th Task Force Meeting was held on 31.05.2006 and recommended “declaration of elimination”.

10

Role of Partners in Yaws Eradication Programme

India implemented Yaws Control Programme from 1952-1964, with support from WHO and other international agencies. In the 1950s a mass campaign for treatment of cases and contacts with mass administration of penicillin was launched. Assistance came from WHO in the form of the main medicine used for the program, Penicillin Aluminium Monostearate. UNICEF provided some hygiene requisites like soap.

Role of World Health Organization

- WHO developed a Regional Strategic Plan and assisted India in developing its National Plans
- Interacted and advocated with policy makers, international development partners and NGOs and thereby assisted the country in mobilizing the required resources for yaws eradication
- Promoted yaws eradication as an achievable goal
- Procured drugs and injectibles including disposable syringes/needles, so that all cases and their contacts are provided with treatment
- Procured vehicles for use in the endemic states for facilitating intensive project activities.
- All Expert Group and task force meetings were supported logistically and technically by WHO.
- Assisted India in the development and printing of appropriate advocacy and IEC materials for different target groups
- Assisted in orientation of key groups like media, teachers, religious leaders and local community leaders

- Provided technical inputs for establishing and strengthening yaws surveillance systems
- Assisted in capacity building and in the monitoring and evaluation of the yaws eradication programme
- Formed partnerships and networking with partners

11

The Future-Towards Eradication

Roadmap from elimination to eradication

Professional commitment from the health staff with strong policy and administrative support will have to be ensured till the goal of eradication is achieved. There would be a tendency to complacency as elimination has been achieved and no cases are being reported. To overcome this, a supportive supervision and monitoring mechanism would have to be strengthened. The activities as described below will have to be continued:

- Yearly yaws active case search and concurrent sero surveillance.
- Surveillance and IEC
- Verification of reports by the states/districts
- Validation of nil report by yearly Appraisal of YEP by independent experts
- Meeting of State Programme (YEP) Officers
- Case/rumour verification
- National Commission for certification of Eradication of Yaws from India.
- Validation by International Organization.

Annexures

Annexure I

Members of Task Force on Yaws Eradication Programme in India Constituted on 11 April 2000

1. Director General of Health Services - Chairperson
2. Director, NICD
3. Dr.J.P.Narain, Regional Advisor, SEARO, WHO
4. Dr.Lalit Kant, Sr.DDG, ICMR
5. Director, CHEB
6. Consultant (Dermatology),Safdarjang hospital
7. Dr.Krishna Ray, Consultant (Microbiology),Safdarjang hospital
8. Dr.P.K.Mohanty, Director, Ministry of Tribal Affairs
9. Director, Health Services, Andhra Pradesh
10. Director, Health Services, Madhya Pradesh
11. Director, Health Services, Maharashtra
12. Director, Health Services, Orissa
13. Dr.Sunil Gupta, Joint Director & Head (Microbiology) NICD
14. Dr.R.Panda, Asst. Director, NICD, Jagdalpur
15. Dr.A.C.Dhariwal, Joint Director, (Epidemiology), NICD
16. Dr.D.C.Jain, Chief, Epidemiology division, NICD, Delhi- Member Secretary

The Terms of reference were:

- To review the progress of the implementation of the programme
- To suggest changes in the strategy of the programme
- To develop the criteria for case detention, endemicity and deletion of the area
- To suggest the method of monitoring and evaluation.

Annexure II

Minutes of the Meeting of the Standing Finance Committee on Scheme held on 14-2-1996 to Consider Yaws Eradication Programme

A meeting of the Standing Finance Committee (SFC) was held under the Chairmanship of secretary (H) on 14-2-1996 to consider the National Yaws Eradication Programme. List of Members who attended the meeting is at Annexure.

1. After the members were introduced to the secretary (Health), Director, NICD stated that Yaws could be cured and prevented by injecting a single shot of long acting Pencillin. The disease spreads only when there was personal contact in hot and humid climatic conditions. He further stated that identification of the affected people was the main problem as such people were living in inaccessible terrain of tribal areas. Director, NICD stated that they would require 3 years to interrupt the transmission of the disease and also require 2 years surveillance period to ensure its complete elimination. He further stated that the district of Koraput in Orissa was regularly reporting Yaws cases to the extent of about 200 per annum. Recently, this district has been divided into 4 districts. For the implementation of the Programme, Koraput will be treated as a single district.
2. Advisor (Health) stated that Yaws Control Programme was being run in tribal areas by the state Govts. for last 30 years or so, but nevertheless the disease had not been eradicated. Therefore, she was of the view that the programme should be taken in the district of Koraput alone on pilot basis and depending on its success, it could be implemented in other areas. She enquired if the existing infrastructure would be able to handle the programme in the district. Director, NICD stated that even though state teams have been working

- there for the last so many years, they have not been able eradicate the disease and perhaps there was a greater need now to give a thrust to the programme by deployment of a Central Team for coordination for search and containment measures by the existing health functionaries of the state.
3. Secretary (Health) stated that since the disease could be cured and prevented by a single injection of long acting penicillin, the possibility of taking up the programme in all the 12 districts, where Yaws was prevalent may be explored. JS(FA) stated that in the 1995-96 Budget, provision was not available to take up the programme. Therefore, the programme may start from 1996-97 with necessary budgetary provision. Director, NICD confirmed that budgetary provision was not available in 1995-96. However, they had received some assistance from the WHO Country Budget and had trained some staff in the district of Koraput, Bastar and Khammam by utilizing the assistance. Out of the total of about 500 Yaws cases reported, annually Koraput alone reported about 200 cases. He further stated that as per their estimate, the number of Yaws cases in the district of Koraput would be around 1500 per year. To a query of DS, Plan Finance II, Director, NICD stated that no survey had been done to find out the exact number of cases. However, as experts view, perhaps the number of cases in district Koraput would be around 1500.
 4. The creation of the post of Consultant and Yaws Surveillance Team for the district of Koraput including an Epidemiologist, Para- Medical assistant and driver was considered. The committee agreed to the creation of posts and their appointment on contractual basis, as proposed.
 5. It was decided that the expenditure of on amount of drug and active search should be made out of the NICD budget during 1996-97 onwards. It was decided that one year, i.e., 1996-97 should be utilized for active search and three years thereafter may be period of surveillance.
 6. Keep in view the areas of the district and the expected number of yaws cases following budget was approved for the search and drugs in the district of Koraput.

Table 12

(Amount in Rs. lakhs)

S.No	Item	1996-97	1997-98	1998-99	1998-2000	Total
1	Active search	18	2	2	2	24
2	Drugs	10	0	0	0	10
	Total	28	2	2	2	34

The remaining expenditure was proposed to be met out of WHO country budget or through any other extra budgetary resources as mentioned.

Table 13

S. No	Item	1995-96	1996-97	1997-98	1998-99	1999-2000	Total
1	Vehicle	0	3.0	0	0	0	3.0
2	Training	4.2	2.0	0	0	0	6.2
3	Yaws surveillance team	0	3.0	3.0	3.0	3.0	12.0
4	Printing of manuals and diagnostic cards	1.1	0.4	0.4	0	0	1.9
5	Laboratory support	0	0.35	0.35	0.15	0.15	1.0
6	Independent appraisal	0	0.5	0.5	0.5	0.5	2.0
7	Consultant	1.8	1.8	1.8	1.8	1.8	9.0
8	Miscellaneous	0	0.1	0.1	0.1	0.1	0.4
9	Total	7.1	11.15	6.15	5.55	5.55	35.5

Conclusion

1. The committee approved taking up this programme on pilot basis in Koraput district at a total cost of Rs.69.5 lakhs. Out of which Rs.34 lakhs would be met from the Govt. of India budget and Rs.35.5 lakhs out of WHO country budget. The project period would be 5 years.
2. The post agreed to are on contract basis for the district of Koraput (as per para 4)
3. During the year 1996-97 an active search of the cases be made for identification and the remaining of 3 years be used for active surveillance
4. Budgetary allocation would be as per para 6 above.

List of Participants

1. Shri P.P.Chauhan, Secretary (Health)
2. Dr.(Mrs.)Prema Remachandran, Advisor (Health), Planning Commission
3. Smt.A.P.Ahluwalia, Joint Secy & FA, Min of H&FW
4. Smt.Sunila Basant, Joint Secretary (SB), Min of H& FW
5. Sri P.K.Gera, Dy Secretary (PF- II), Deptt of Expenditure, Ministry of Finance
6. Sri K.K.Dutta, Director, NICD
7. Dr.D.C.Jain, Joint Director, NICD
8. Dr.A.C.Dhariwal, Joint Director, NICD
9. Sri K.C.Mishra, Under Secy, Min of Health &FW

Annexure III

Minutes of meetings of Expert Group on Yaws Eradication

Expert Group Meeting under the Chairmanship of Dr. S. Pattanayak, WHO Consultant (CD), SEARO/WHO held in April 1996

Recommendations

Experts deliberated on the different issues as per the terms of reference and made the following recommendations.

1. The draft document on programme strategy and operational guidelines of Yaws Eradication Programme in India was approved as such with modifications like adding more responsibilities to NICD such as providing technical assistance, drug and motility support and incorporation of the colour photographs showing different type of yaws lesions (early as well as late) in the revised document. **(Action: NICD)**
2. An implementation plan for Yaws Eradication Programme consisting of training of Medical Officers, Paramedicals and village level informants (½ - 1 day each), case detection and treatment by house to house search at 4 months interval in a year by the paramedical staff and routine detection of cases during inter-search period was suggested by the group. **(Action : NICD/ State DHS/CDMOs)**
3. The group recommended injectable long acting penicillin as the drug of choice for treating Yaws cases. Due to chances of serious reaction to penicillin (Anaphylatic shock) in isolated cases, the penicillin should be administered at the places where the facilities are available to handle the reaction cases. **(Action : CDMOs)**

4. Drug to attend the adverse reactions following penicillin injection should be made available at the places where treatment will be instituted. **(Action : CDMOs)**
5. All the district and the health authorities should be advised to ensure that the multipurpose health workers should carry supporting drug and dressing materials during their field visits. **(Action : CDMOs)**
6. Laboratory confirmation of cases shall be done by RPR card test at PHC and district level hospital. **(Action : CDMOs)**
7. The draft document on training, guidelines was approved with suggestions to add more operational aspects, including logistics and supplies. **(Action : NICD)**
8. A standard training module should be developed and used during the training programme to ensure uniformity in training. **(Action : NICD)**
9. Health personnel should not be mixed with others for training at health unit level. Health workers and health supervisors should be trained together. The training should be made practical oriented.
10. Sector Level Training can be taken up for half-a-day with view to make the personnel recognize cases of Yaws and help in obtaining public co-operation in various YEP activities. Efforts should be made to demonstrate Yaws cases to the trainees. Reorientation training for field workers shall be organized before every search so that the searchers remain well conversant with the programme activities. **(Action : CDMOs)**
11. The reporting system should be organized and followed at regular monthly intervals from sub-centre to Primary Health Centre, Primary Health Centre to district headquarters, district headquarters to state head quarters, with a copy to NICD, Delhi. The reports should be thoroughly reviewed and feed back should be given. After each search, a report with map of the district showing blocks and village endemic for Yaws and number of cases detected and treated should be sent by the district to NICD, Delhi with a copy to state headquarters. **(Action : NICD /State DHS /CDMOs)**

12. Internal review of the programme by the officers of the state and NICD should be organized every year. This will help in identifying the operational constraints and finding solution to the problem. External evaluation should be done at intervals of 3 years by independent agencies. When no indigenous case has appeared in the population for a period of 3 years, final evaluation will be done by sample serology of children under 5 years of age group. **(Action : NICD/DHS)**
13. NGO's will be identified by the health authorities of the district to help in crating mass awareness, case detection and resource mobilization. **(Action : CDMOs)**
14. Govt. agencies such as ICDS, Tribal Welfare Department, Panchayat Raj Department, Forest Department, Education Department and Projects operated in the districts were identified to help in programme activities such as case detection in mother and child population, inaccessible areas, ITDA Ashram Schools. **(Action: CDMOs)**
15. Intra sectoral and inter- sectoral co-ordination should be evolved at different levels for effective implementation of the eradication programme. **(Action: CDMOs)**
16. The central coordinating lab. shall conduct External Quality Assurance (EQA) by sending coded serum samples for RPR testing. The poor performance shall be identified and appropriate improvement suggested. **(Action: NICD)**

Annexure IV

First Meeting of Task Force on Yaws Eradication Programme (YEP) held on 18.08.2000

1. First meeting of the Task Force on Yaws Eradication Programme (YEP) was held on 18.08.2000 at New Delhi under the Chairmanship of Dr.S.P.Agarwal, Director General of Health Services, Govt. of India with the following agenda items:
 - i) To assess the progress made in the effective implementation of the programme, and
 - ii) To suggest changes in the strategy of the programme, if there is any.

Recommendations

1. Printing of yaws recognition cards
2. Post monsoon active case search to be undertaken to achieve high coverage level
3. Assess the feasibility of using filter strip method vis-à-vis finger prick method

Second Meeting of Task Force on Yaws Eradication Programme (YEP) held in October 2001.

Recommendations

Various issues related to programme implementation were discussed and following decisions were taken:

- i) It was decided to constitute a sub-group consisting of experts from following organizations to develop a protocol for the sero surveillance under the programme by December 2001. (a) ICMR, (b) AIIMS, (c) Safdarjung Hospital, (d) RML Hospital, (e) NICD and (f) State representatives.

The protocol should cover type of tests to be performed, number of samples to be collected, method of collection and transportation of the sample and quality assurance method.

(Action: NICD)

- ii) As in most of the states cases are being reported from the bordering areas, it was agreed upon to organize an interstate border meeting calling district and state level officers so that more concerted and coordinated efforts may be initiated in the bordering areas. **(Action: NICD)**
- iii) The search activity for yaws cases may also be undertaken along with campaigns, where house-to-house visits are made, like Family Health Awareness Campaign of NACO, Modified Leprosy Elimination Campaign for which it was decided that ADG(PH) would coordinate with other programme officer. **(Action: ADG(PH))**
- iv) Injection safety is a major concern in view of the increasing problem of hepatitis-B & HIV/AIDS and as injection benzathine penicillin is being extensively used under the programme, it was decided that in order to search the alternative method, ICMR may take up study to see the feasibility of use of single loading dose of oral antibiotics for treatment and prevention of yaws. **(Action: ICMR)**
- v) It was decided that all the yaws endemic states should organize two active searches of which one should be in the post-monsoon period (October- November) and the other in March-April. And all efforts to be made to achieve high coverage level during the search. After completion of the search activity state government should send the report to NICD at the earliest. **(Action: State Health Directorates)**

Annexure V

Minutes of Third Task Force Meeting on Yaws Eradication Programme (YEP) held in July 2002

Recommendations

Various issues related to programme implementation were discussed and following decisions were taken:

- i) Active search to be organized in the endemic states and districts during 11-20 November 2002, before which a sensitization workshop involving ministry of tribal affairs, deptt. of women and child health (ICDS), Panchayati Raj institutions, Forest and Environment, etc. should be organized at the centre and the state level and the same may be publicized using all media (print, electronic, etc). **(Action: Deptt. of Health/States Health Directorates)**
- ii) During active searches, as well as passive surveillance activities, case definition, as given in operational guidelines under the programme should be strictly adhered to. This will be possible only by close supervision by the programme officers of all state and district level. **(Action: State Health Directorates)**
- iii) Before the search during November 2002, availability of drugs (injection benzathene penicillin, erythromycin, tetracycline etc) at treatment centre should be ensured. **(Action: State Health Directorates)**
- iv) Considering the short period available to achieve the goal of yaws eradication by 2005, as per the national health policy 2002, efforts (timely search, detection and treatment of cases and contacts, creating awareness in the community) for eradication need to be intensified. **(Action: NICD/CHEB/ State Health Directorates)**
- v) In the areas where no cases have been detected during the last three active searches like Gadchiroli, Chandrapur

district of Maharashtra, Raipur district of Chattisgarh, etc, sero surveillance in under-five children using the protocol developed by the experts may be initiated. **(Action: State Health Directorates)**

Annexure VI

Minutes of Fourth Meeting of Task Force held in July 2005

Recommendations

1. Revised case definition incorporating laboratory component to be adhered to in all the future activities under YEP. All the states to be informed accordingly. **(Action: NICD, DHS)**
2. Cases should be reported only after laboratory confirmation. **(Action: DHS)**
3. Sero surveillance among <5 children may be carried out in all the districts under YEP as per recommendation of Task Force. **(Action: NICD, DHS)**
4. Synchronized yaws active case search be carried out from 17th to 26th October 2005. Inter-sectoral co-ordination may be pursued actively. **(Action: NICD, DHS)**

In the concluding remarks Dr.Shiv Lal, Addl.DG & Director, NICD expressed hope that, with the revised case definition the “Nil” status could be validated by next independent appraisal of the programme and Yaws Elimination could be declared as targeted.

Annexure VII

Minutes of Fifth Meeting of Task Force on Yaws Eradication Programme (YEP) held in May 2006

Recommendations

After detailed deliberations, following decisions were taken:

1. Elimination of Yaws as recommended by the Expert Group as per the criteria set in the Task Force Meeting held on 26.07.2005 can be declared which will be a step towards eradication. This would also encourage the health staff of the concerned districts to intensify their efforts to achieve the goal of eradication (**absence of new cases for a continuous period of three years, supported by absence of evidence of transmission with sero-survey among under five children**).
2. The programme should now focus on the activities as under to achieve the goal of eradication:
100 Strengthening of routine surveillance
 - Close supervision and monitoring of programme activities.
 - Intensive active search particularly in post monsoon period with focus on difficult to reach areas and primitive tribal group.
 - School surveys
 - Sero-survey in under five children.
 - Extensive IEC activities.
 - Documentation of the process of eradication.

At the end, the Task Force concluded that we may declare the elimination of yaws and NICD should work in close collaboration with the states and other related sectors to initiate the steps for achieving the goal of eradication as mentioned above.

Annexure VIII

Minutes of the Expert Group Meeting held under the Chairmanship of Dr.S.Pattanayak, Former Regional Advisor, SEARO, WHO to Discuss the Status of Yaws Elimination on 25.04.2006 at NICD, Delhi

Recommendations

After detailed deliberations, following decisions were taken:

1. **Based on the review of the programme activities, report of the independent appraisals, interaction with the experts and result of laboratory samples tested at NICD laboratory, the expert group felt that yaws elimination can be declared.**
2. The group suggested that after declaration of elimination, surveillance and IEC will have to be continued till eradication is achieved. For the same, following methods were suggested:

A) Clinical surveillance:

- i) Active search for detection of yaws case need to be continued as per programme guidelines.
- ii) Inter search surveillance to be continued.
- iii) Special watch to be kept in difficult-to-reach villages, primitive tribal groups (PTG) and weekly "haat" markets by health workers, supervisors, health officials.
- iv) Anganwadi and malaria link workers may be involved in detection of cases.
- v) School surveys to be conducted twice every year covering all the schools of the yaws endemic areas.

B) Sero surveillance

Sero surveillance in under-five children as per protocol on yearly basis should be undertaken.

3. The group opined that institution of award as decided by the Government to the informers for proven cases of yaws, would facilitate the early reporting of cases.
4. IEC activities will have to be continued to maintain the level of awareness not only among community members but also among health workers and health professionals so as to achieve the ultimate target of eradication. Good personal hygiene including use of soap should be ensured in at-risk areas.

Annexure IX

First Independent Appraisal of Yaws Eradication Programme held in April 2000

Executive Summary

Yaws Eradication Programme (YEP), a central sector health programme is in operation since 1996-97. The first independent appraisal of the programme was carried out in 5 states (Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra and Orissa) where the programme is in operation for last two- three years. during 24th April to 3rd May 2000.

The objectives of the appraisal were to:

- i. assess the level, content and status of implementation of the programme;
- ii. elicit the community and professionals' perception about the programme;
- iii. identify problems and constraints in the implementation; and
- iv. suggest appropriate corrective measures to strengthen the programme.

A two member team comprising of an independent expert and one NICD officer visited each identified state (except Madhya Pradesh) for the appraisal. Each team visited state Head Qtr, one medical college (except in Andhra Pradesh) one district, two PHCs and four- six villages of the same district. Requisite information was collected through interview of personnel at different levels from health and other related sectors as well as community members, and study of relevant department records.

Salient observation made by the teams are summarized below:

- The nodal officers are identified for YEP at state and district levels. However, besides YEP, they are also responsible for number of other activities including other public health programmes. This is adversely affecting the monitoring and supervision of the programme
- Very low priority was attached to the programme at all levels. The perception about the objectives of the programme and overall impact on improvement of health of tribal population was poor.
- Community was very cooperative for activities under the programme, However, communities' awareness of certain facts about yaws was poor. IEC activities for disseminating information about yaws and its eradication programme were not getting due importance
- Drug supply was observed to be erratic in some places. This interfered with simultaneous treatment of cases and contacts during active search.
- Failure to treat adequate number of contacts per detected cases was a common lacuna in the states visited.
- The implementation of the programme was observed to be satisfactory in Andhra Pradesh, Gujarat and Maharashtra. But needed impetus in Madhya Pradesh and Orissa.

Important suggestions given by the teams for strengthening the programme are :

- There is an urgent need to improve the perception of the programme especially at higher levels. The fact that this programme is a tool to reach the unreached and improve the health of the tribal population should percolate to implementing authorities at state, district and subdistrict level. The programme will then automatically get the priority it deserves.
- The active detection of cases and treatment (active search) should be synchronized in such a way that all the states take the activity at the same point of time especially in bordering

areas so that cases and contacts can receive the treatment simultaneously. This will help in covering migrating population in border areas.

- All the clinically diagnosed cases and adequate number of contacts should be treated immediately after detection by the search team. This point needs to be emphasized and put into the practice.
- Data at state and district level should be collected and analysed on monthly basis. Passive surveillance for yaws needs to be supervised and strengthened.
- Yaws Surveillance Teams with mobility support should be deployed in at least three states.(Andhra Pradesh, Madhya Pradesh and Orissa) where problem is more in terms of population and area at risk and additional inputs are required to achieve programme objectives.
- Extensive IEC campaigns are essential as community awareness and participation are crucial for the success of the programme.
- Supporting the states with a full-time technical officer on contractual basis exclusively for YEP should be considered as was done under with Guinea Worm Eradication Programme.
- Mechanism for inter-sectoral coordination need to be developed and used for achieving the objective of the programme.

Annexure X

Second Independent Appraisal of Yaws Eradication Programme (February and November 2002)

Executive Summary

The Yaws Eradication Programme (YEP), a central sector health programme, is in operation since 1996-97. Independent Appraisal is being undertaken from time to time. The first independent appraisal was undertaken during April 2000. The Second Independent Appraisal of the programme was carried out during February and November 2002 in six states, viz., Andhra Pradesh, Gujarat, Madhya Pradesh, Maharashtra, Orissa, Chattisgarh, where the programme is in operation for last 4-5 years. In these states, the appraisal was undertaken during February 2002. For logistic difficulties and administrative reasons, the appraisal was carried out in Uttar Pradesh and Assam during November 2002.

Methodology

The appraisal was carried out in eight states by an eight member team of independent experts. Each team visited one state, one district, two PHCs and four to five villages. Besides eliciting information from the concerned health functionaries till PHC level, the team also interacted with at least 10 residents (head or elderly person of the family) in each selected village, as well as its MPW.

The districts were selected from amongst the affected districts of the state by the central panel. The team selected PHCs from the identified district and villages from the identified PHC. The criteria for selection was:

- Village/s reported yaws case in last active search
- The remotest, non-motorable village of the PHC; and
- If need be, randomly selected.

Briefly the time schedule followed for appraisals is as below:

Day	Date	Activity
1		Briefing at NICD
2		Departure to State HQ Meeting with state health authorities Visit to local medical colleges
3		Departure to district HQ Meeting with district administration/health authorities
4		Visit to first PHC & villages
5		Visit to second PHC & Villages
6		Debriefing to district officials
7		Return journey
8		Report writing
9		Presentation of report
10		Finalization of report

The objectives of the appraisal were to:

- assess the current status of programme implementation with special reference to adherence to guidelines.
- understand the perception of the community and functionaries about the programme.
- assess the progress made with reference to recommendations of the first independent appraisal
- identify problems and constraints in the implementation of the programme.
- suggest appropriate measures to strengthen the programme based on observations.

Formation of Expert panel

As per YEP strategy, Expert teams were constituted for undertaking second appraisal of YEP. A two member team comprising of an independent expert and one NICD officer visited each identified state for the appraisal (List is

annexed). The team visited districts Gadchiroli (Maharashtra), Vizianagaram (Andhra Pradesh), Shehdol (Madhya Pradesh), Dantewara (Chhattisgarh), Ahwa-Dang (Gujarat), Mayurbhanj (Orissa), Kallakurchi (Tamil Nadu), North Cachar Hill (Assam), Sonbhadra (Uttar Pradesh)

Salient observations made by the teams are summarized below:

- There is need for improvement in search quality,
- Record pertaining to YEP activities were not meticulously maintained at PHC level,
- In several places “Yaws recognition card” was not in local language,
- Knowledge of Medical Officers regarding YEP was not very satisfactory,
- PHC medical officers’ visits to yaws affected areas were very few,
- Contact tracing not very satisfactory and contacts were treated only after report of RPR test,
- Line listing was not up to date,
- Though trained, other community level workers, viz., Anganwadi workers, were not utilized for YEP,
- Remuneration for health staff was not paid,
- The problem seems to be persisting in bordering villages,
- Funds not released timely to the districts,
- YEP cell not constituted at different levels.

Important suggestions given by the teams for strengthening the programme are:

1. Programme may be periodically reviewed at state level,
2. Intersectoral co-operation may be strengthened,
3. Utilization Certificates should be submitted without delay,
4. In areas from where no case has been reported since last couple of years, monetary incentive may be given for reporting new case,
5. IEC activities may be strengthened at village level,

6. Local level NGOs, youth club or other voluntary paramedical manpower, wherever available, should be involved in case detection activities,
7. Skin camps may also be organized in high risk areas,
8. "Yaws recognition cards" may be revised to include more pictures of early cases,
9. State Yaws nodal officer should be given more responsibility to supervise the search activity and to guarantee quality of work,
10. Treatment of cases and contacts must be done immediately
11. Proper case management, supply of dressing material at village level,
12. Better co-ordination between PHC staff, M.O. and anti-yaws unit
13. Synchronized search operation in bordering states/ districts
14. To prepare proper line listing

Annexure XI

Third Independent Appraisal of Yaws Eradication Programme 27th January to 5th February 2004

Executive Summary

The Yaws Eradication Programme (YEP), a central sector health programme, is in operation since 1996-97. Independent Appraisal is being undertaken from time to time. The 1st independent appraisal was undertaken during April 2000. The 2nd Independent Appraisal of the programme was carried out during February and November 2002.

To set objectives and methodology for the third independent appraisal of YEP, a team of experts met on 12.11.2003. Important recommendations of the Expert team were: (1) to select the states on the basis of yaws case reporting, (2) villages to be selected on the basis of remoteness and approachability, and (3) inclusion of one clinician (Dermatologist) in the appraisal team. The expert team also approved tool/instrument for appraisal and suggested constitution of the team for different states.

As per above, the third Independent appraisal of YEP was carried out from 27th January to 5th February 2004. Five independent appraisal teams visited six yaws endemic states (Andhra Pradesh, Chattisgarh, Gujarat, Maharashtra, Orissa, and Tamil Nadu) from 28.01.2004 to 03.02.2004. The team presented their observations in a de-briefing meeting on 5th February 2004.

Salient observations by the teams:

1. None of the team could find a case of yaws in the areas visited. All the reported cases verified by the team (or accompanying dermatologists) were other than yaws.

2. Overall quality of search coverage was found to be satisfactory. However, the frequency of search, in few states was not as per programme guidelines under YEP.
3. No regular trainings are being conducted in recent times. Hence newer appointees are not well conversed with YEP; they need to be trained
4. IEC activities varied from state to state. In Andhra Pradesh, Chattisgarh, Gujarat and Maharashtra the IEC activities were found to be satisfactory, whereas in Orissa, it needed much improvement.
5. The report and record are being maintained as per programme guidelines in Maharashtra and Gujarat, these needed to be improved in other states
6. "Yaws recognition card" need to be modified by omitting photographs of old cases.
7. Team also expressed its concern about funds being remaining unutilized and UC not submitted in time.
8. By and large, the socio-economic status of tribal people, who are thought to be vulnerable for yaws infection, was found to be much better. Though there is no regular transport, Jeepable roads connects the most remotest villages in the states visited by the teams.
9. The teams expressed their optimism about timely elimination of yaws disease in the country.

Broad Recommendations

1. A well planned good quality search with the aim to achieve high coverage (85 percent and above) should be organized during pre and post monsoon in 2004 in all the yaws endemic states.
2. Strategy should be changed from mass approach covering entire area of the block to selective approach in difficult to reach area.
3. Re-orientation training of all category of staff should be organised before active search.
4. Anti-yaws teams in the state of Orissa should work in collaboration with PHC Medical Officer.

5. “Yaws recognition card” should be suitably modified to include early yaws cases, as pictures of chronic cases led to reporting of false cases.
6. Yaws should be included in monthly reporting format of PHC, for maintaining regular reporting and passive surveillance.
7. Extensive IEC activities should be undertaken using folk media in all the states before the active search campaign.
8. Statement of Expenditure (SOE) & Utilization Certificates (UC) should be submitted to nodal agency in time, so that, timely release of fund could be ensured to all the states under YEP.

Annexure XII

Fourth Independent Appraisal of Yaws Eradication Programme 19th December to 27th December 2005 and 18th April to 25th April 2006

Objectives

- Validate “Nil” case status as reported by the states
- To assess the progress in the implementation of the programme and recommendations of the earlier appraisals
- To assess the preparedness of state for verification of rumours and routine surveillance
- To find out the quality of the active search in terms of planning and coverage
- To assess the IEC activities in terms of their effectiveness and impact
- To evaluate the surveillance and monitoring system

Activities undertaken

The appraisal teams consisting of public health experts and dermatologists (List is annexed) visited Vizianagaram district of Andhra Pradesh and districts of Bastar & Dantewara in Chattisgarh during December 2005. Team consisting of public health experts visited Kandhamal district, Orissa and Gadchiroli district, Maharashtra during April 2006.

The teams performed following activities during the visit.

- apprised activities under YEP at difficult to reach villages
- visited PHCs to assess surveillance qualities, record keeping etc
- visited district head quarters to assess surveillance qualities, record keeping, fund position, IEC etc
- verified surveillance qualities, record keeping, fund position, IEC etc. at state head quarter.

All the teams validated the “Nil” case status of yaws as reported by the state governments.

The report of the team was presented in the 5th Meeting of Task Force on YEP held on 31.05.2006 under the chairmanship of Director General of Health Services, Min, of H&FW, GoI, and paved the way for declaration of elimination of yaws from India.

Annexure XIII

List of State Programme Officers for YEP

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- 1 Dr.D.Ramesh Chandra 040- 2465 6852 (Telefax)
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Sultan Bazar, Hyderabad (A.P.), PIN: 500 001 dir_health@ap.gov.in

Assam

- 2 Dr. Jagendra Neog 0361-2261503
Joint Director of Health Services & SPO (YEP) 0361-2261 151
Hengerabari, Guwahati (Assam), PIN:781 036 0361-2561089 (Tlefax)

Chattisgarh

- 3 Dr.B.P. Malani 0771-2221 621(telefax)
State Programme Officer (YEP) 0771- 2235 616
Directorate of Health services 0771- 2331 617 (R)
Opp.Mantranalay Chattisgarh 0771- 2432 717 (R)
Behind D.K.Bhawan, Raipur.PIN: 492 001

Gujarat

- 4 Dr.S.J.Gandhi 098253 42899 (Mobile)
Dy. Director of Health Services & SPO (YEP) 079- 2322 1854
Commissionerate of Health, Block 5 079-2325 3335/36
Jivraj Mehta Bhawan, Gandhi Nagar. PIN:382 010

Jharkhand

- 5 Dr.A.K.Singh
Dy.Director & SPO (YEP),
Govt of Jharkhand
Itki, Ranchi. PIN:834 002

Madhya Pradesh

- 6 Dr.B.N.Chauhan 0755-2554 266
Jt.Director of Health Services & SPO (YEP) 098262 82249
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Maharashtra

- 7 Dr.B.R.Shende 094223 15516
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Pune (Maharashtra) PIN:411 001

Dr.Satish Power , Asst. Director, Mumbai 020- 2612 2256 (Telefax)

Orissa

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0674-2391230, 2419234 0674- 2402 727 (R)/2392727

Tamil Nadu

- 9 Dr.Jagdish Ramasamy 044- 2432 1569 (Telefax)
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259, Anna Salai, Chennai. PIN:600 006 044-5211 7319 (R)

Uttar Pradesh

- 10 Dr.A.K.Misra 0522-2222 819 (Telefax)
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Swasthya Bhawan, Lucknow, PIN:226 001

Annexure XIV

List of Experts for Independent Appraisals

Appraisal dates	Independent experts	Clinician	NICD & State coordinator	Districts visited
1 st Appraisal 24.04.2000 to 03.05.2000	Dr. A.R.Rao Former DPH, Tamil Nadu		Dr. S.K. Patnaik JD & OIC, NICD, Rajanmundry.	Khammam, A.P.
	Drt. V.B. Saxena Former Dean, Raipur Medical College. CG		Dr.A.K. Harit CMO, Epid division, NICD	Dang, Gujrat
	Dr. J.C .Gandhi Former Addl. Dir., Gujarat		Dr. R.Panda OIC, NICD Jagdalpur	Jagdalpur Chattishgarh
	Dr. M.Dutta Former DDG (P), GOI		Dr. Avdhesh Kumar DD, Epid division, NICD	Sidhi, M.P
	Dr. R.S. Sharma Former Director NAMP Delhi.		Dr. Anil Kumar DD, Epid division, NICD	Gadchiroli, Maharashtra
	Dr. G.Prakash Former DHS, Rajasthan		Dr. P.K.Patnaik JD, Epid division, NICD	Koraput
2 nd Appraisal Feb. & Nov. 2002	Dr. J.C. Gandhi Former Addl. Dir., Gujarat		Dr. A.K. Khera DD, Epid division, NICD	Gadchiroli, Maharashtra
	Dr. A.R.Rao Former DPH, Tamil Nadu		Dr.Anil Kumar & Mr.M.Simhacherry SPO, (YEP). A.P.	Vizianagaram, A.P.
	Dr. V.N. Sardana Former Addl. Director, NICD, Delhi		Dr.Uma Chawla DD, Epid. Division, NICD	Shehdol, M.P.

Appraisal dates	Independent experts	Clinician	NICD & State coordinator	Districts visited
	Dr. G.Prakash Former DHS, Rajasthan		Dr. S.K. Jain AD, Epid division, NICD Dr. R. Panda	Dantewara Chattishgarh
	Dr. V.B. Saxena Former Dean, Raipur Medical College.		Dr. S.K. Patnaik JD & OIC, NICD, Rajanmundry.	Dang Gujrat
	Dr. K.K. Dutta Former Director NICD, Delhi.		Dr. P.K.Patnaik DD, Epid division, NICD	Mayurbhanj Orissa
	Dr. M.Dutta Former DDG (P), GoI		Dr. Shibani DD, Epid division, NICD	Kallakurchi Tamil Nadu
	Dr. J.C .Gandhi Former Addl. Dir.,		Dr. J.K. Sahariya JDHS, Assam	North Cachar Hill, Assam
	Dr. V. M. Gupta BHU, Varanasi		Dr. R.N. Rai JD & OIC, NICD, Varanasi	Sonbhadra (U.P)
3rd Appraisal 27.1.04 to 05.02.04	Dr.(Brig.-Retd.) S.L.Chadha, Consultant, Community Health	Dr.A.K.Saxena, Senior Dermatologist, Safdarjung Hospital, New Delhi	Dr.S.K.Patnaik JD & OIC, NICD, Rajanmundry. Dr.V.R.Meena, CMO, Dept. of Parasitic Diseases, NICD	West Godavari, A.P.
	Dr.Gyan Prakash, Former Director of Medical and Health Services, Govt. of Rajasthan		Dr.R.S.Gupta, & Dr.B.P.Malani State nodal officer for YE P	Sarguja & Raipur, Chattisgarh

Appraisal dates	Independent experts	Clinician	NICD & State coordinator	Districts visited
	Dr.Mahendra Dutta, Former Dy. Director General, Dte. General of Health Services, GoI, Delhi		Dr.A.C.Dhariwal & Dr.W.R.Hegan, State Epidemiologist, Govt. of Gujarat	Ahiwa Dang, Gujarat
	- Do-		Dr.A.C.Dhariwal Head, Deptt. of Parasitic Diseases, NICD	Gadchiroli & Chandrapur, Maharashtra
	Dr.V.N.Sardana, Former Addl. Director, NICD, Delhi	Dr.P.K.Sharma, Senior Dermatologist, RML Hospital, New Delhi	Dr.D.Bora CMO (SG), Deptt of Parasitic Diseases, NICD	Mayurbhanj, Orissa
	Dr.J.C.Gandhi, Former Addl. Director, DHS, Gujarat	Dr.V.Ramesh, Head, Deptt. of Dermatology, DDU Hospital, New Delhi	Dr.R.Panda, OIC, NICD branch, Jagdalpur	Rayagada, Orissa
	Dr.R.S.Sharma, Former Director, National Vector Borne Disease Control Programme, Delhi		Dr.N.Balakrishan & Dr. Jagdish Ramaswamy, Addl Director(M & F), Dte of Public H & PM, Chennai	Dharmapuri, Tamil Nadu
4 th Appraisal 19.12.2005 to 27.12.2005	Dr.Gyan Prakash Former Director of Health Services, Govt. of Rajasthan	Dr.P.K.Sharma, Sr. Dermatologist, RML hospital, New Delhi	Dr.S.K.Patnaik, JD & OIC, NICD, Rajanmundry.	Vizianagaram, A.P.

Appraisal dates	Independent experts	Clinician	NICD & State coordinator	Districts visited
	Dr.V.N .Sardana Former Addl. Director, NICD, Delhi	Dr.A.K.Saxena, Sr. Dermatologist, Safdurjung hospital, New Delhi	Dr.R.Panda OIC, NICD branch, Jagdapur	Dantewara and Bastar, Chattisgarh
18.04.2006 to 25.04.2006	Dr.G.K.Ingle Prof. & Head, Community Medicine, MAMC, New Delhi		Dr.V.K.Raina Joint Director (E), Deptt.of Parasitic Diseases, NICD	Gadchiroli, Maharashtra
	Dr.S.K.Pradhan Director Professor, Community Medicine, LHMC, New Delhi		Dr.A.C.Dhariwal, Head, Deptt. of Parasitic Diseases, NICD	Kandhamal, Orissa

Annexure XV

Minimum Records to be Maintained at Different Levels

State headquarter

- 1) Spot map of the state showing yaws affected areas as per programme
- 2) Yaws Eradication Programme: Guidelines for Medical Officers
- 3) District-wise report on yaws active case search during last three years, Sero surveillance, IEC generic guidelines
- 4) Monthly report from districts
- 5) List of reportable diseases including Yaws in the list
- 6) District-wise list of difficult to reach villages
- 7) Population break-up (Total population, < 5 children, district-wise)
- 8) Population break-up (Tribal, non-tribal) district-wise
- 9) Line list of cases
- 10) Report on RPR/VDRL/TPHA test at state and district level including availability of technical manpower
- 11) Fund position along with Statement of Expenditure (SOE) and Utilization Certificate (UC) for the last five years.
- 12) IEC materials (Stock, Date of printing, Source of supply)
– Yaws Recognition card, Posters, Hand bills
- 13) Record of inter-sectoral meetings held at state level

District head quarter

1. Identified Nodal Officer for YEP (to collect details: name address, telephone, fax, mobile, e-mail etc)
2. Spot map of the district showing yaws affected areas as per programme
3. Yaws Eradication Programme: Guidelines for Medical Officers, Sero-surveillance, IEC generic guidelines

4. PHC-wise report on active case search during last three years
5. Monthly report from PHC
6. List of difficult to reach villages
7. Population break-up (Total population, < 5 children, PHC wise)
8. Population break-up (Tribal, non-tribal)
9. Status of measles immunization/ immunization PHC wise
10. Line list of cases
11. List of reportable diseases including Yaws in the list
12. Facilities for RPR/VDRL/TPHA test at district level including availability of technical manpower
13. Fund position along with Statement of Expenditure (SOE) and Utilization Certificate (UC) for the last five years.
14. IEC materials (Stock, Date of printing, Source of supply) Yaws Recognition card, Posters, Hand bills

At PHC level

1. Spot map of the PHC area showing yaws affected villages as per programme
2. Yaws Eradication Programme: Guidelines for Medical Officers
3. Sub-centre wise report on yaws active case search during last three years
4. Monthly report from Sub-centres
5. List of difficult to reach villages within the PHC area indicating distance from motorable road
6. Status of immunization ? village wise
7. Line list (Name, S/D/O, Age, Sex, Village)
8. Population break-up (Total population, < 5 children, Sub-centre wise)
9. IEC materials (Stock, Date of printing, Source of supply) Yaws Recognition card, Posters, Hand bills

At sub-centre level

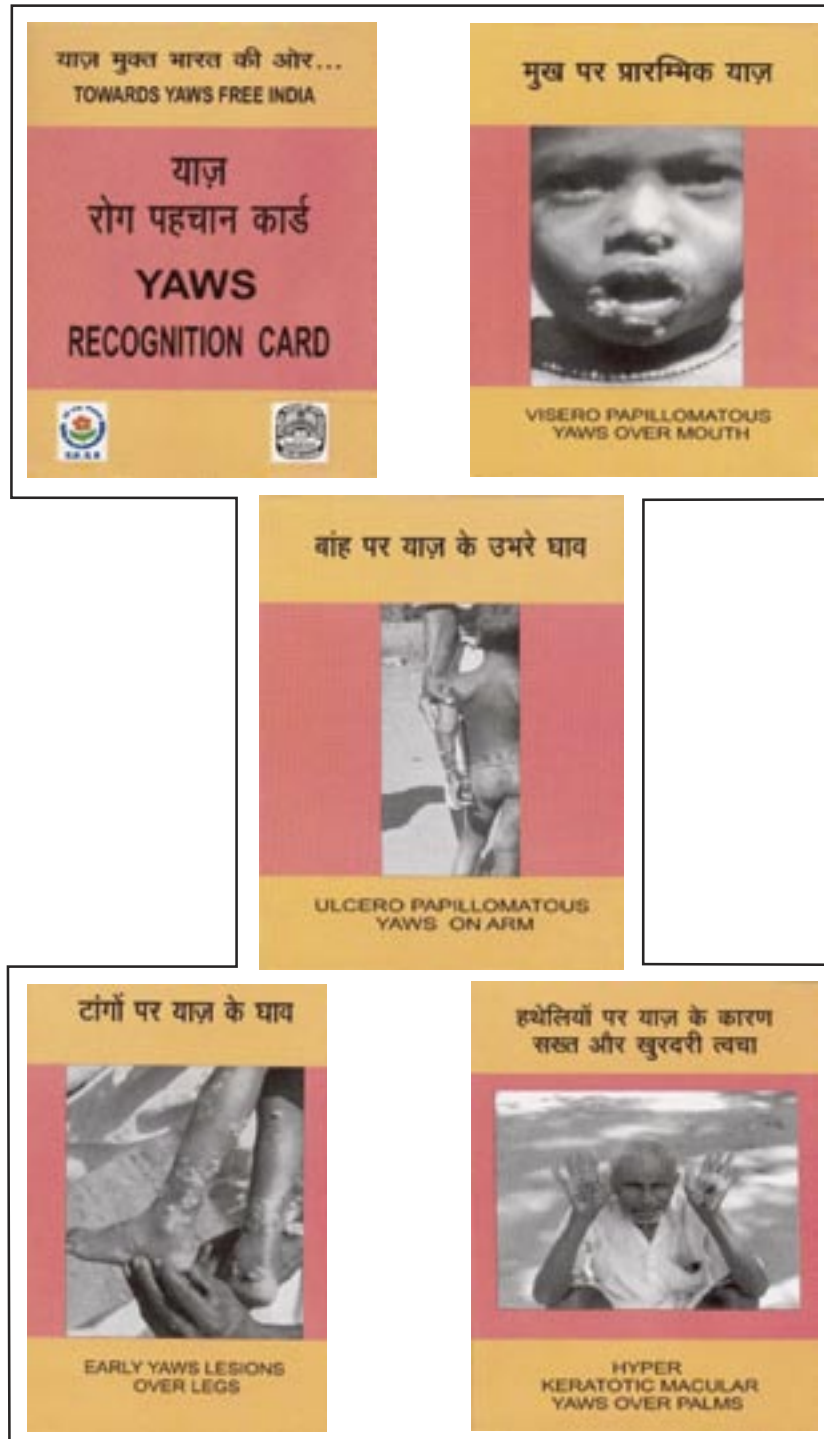
1. Spot map of the sub-centre area showing yaws affected villages as per programme

2. Village-wise report on yaws active case search during last three years
3. Monthly report from Sub-centre to PHC
4. Aanganwari centre (if yes; how many.....)
5. Population break-up (Total population, < 5 children, village wise)
6. List of difficult to reach villages within the sub-centre area
7. Status of measles immunization village wise
8. Line list cases (Name, S/D/O, Age, Sex, Village)
9. Yaws case card
10. IEC materials (Stock, Source of supply)
11. Yaws Recognition card, Posters, Hand bills

At village level

1. Yaws Recognition card
2. IEC materials on display

Annexure XVI



<p>तलवों पर दर्दनाक खुरदरी त्वचा एवं केकड़ा याज़</p>  <p>PAINFUL PLANTAR CRAB YAWS</p>	<p>मुत्तांगों एवं जांघों पर याज़ के घाव - यह यौन जनित रोग नहीं है</p>  <p>MUCO - CUTANEOUS YAWS OVER FEMALE GENITALIA &</p>
<p>पुरुष मुत्तांगों एवं जांघ पर याज़ के घाव - यह यौन जनित रोग नहीं है</p>  <p>MUCO - CUTANEOUS LESIONS OVER MALE GENITALIA</p>	
<p>भल्लाहार पर होने वाले याज़ के घाव - यह यौन जनित रोग नहीं है</p>  <p>MUCO - CUTANEOUS YAWS OVER ANUS</p>	<p>केवल एक टीके मात्र से याज़ का पूरा इलाज संभव है</p> <p>केन्द्रीय स्वास्थ्य शिक्षा बोर्ड, स्वास्थ्य सेवा महानिदेशकालय, स्वास्थ्य एवं परिवार कल्याण विभाग, अटल भवन, नई दिल्ली 110002</p> <p>Central Health Education Bureau Directorate General of Health Services, Ministry of Health and Family Welfare, Atal Bihari Vajpayee Marg, New Delhi 110 002.</p> <p>राष्ट्रीय संक्रामक रोग संस्थान, स्वास्थ्य सेवा महानिदेशकालय - 22-एनए 198 मार्ग, दिल्ली-110054</p> <p>National Institute of Communicable Diseases, Directorate General of Health Services, 22, Shantamath Marg, Delhi 110 054.</p>

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Chronology of Events Leading to Yaws Elimination in India

1952 - 1964	WHO & UNICEF assisted yaws control activities in India
1977	Yaws resurgence reported from Madhya Pradesh
1980	WHA resolution: Yaws as a candidate for regional eradication
1981	Yaws survey in Orissa, Madhya Pradesh, Maharashtra, and Andhra Pradesh by NICD.
1983 - 1985	Yaws survey by questionnaire method covering all the states by NICD
1987	A workshop on Yaws Eradication held at the NICD, Delhi on 19-22 January 1987
1995	One consultant placed at NICD to prepare operational and training manual.
Feb. 1996	Meeting of the Standing Finance Committee (SFC) on Scheme to consider Yaws Eradication Programme (YEP) and approval for piloting in undivided District Koraput, Orissa during 1996-97
April 1996	Expert Group Meeting on YEP, Bhubaneswar, Orissa 1999 Approval of SFC for extension of scheme to cover all the endemic states/districts
April 2000	Constitution of Task Force on YEP in India
Apr.-May 2000	First Independent Appraisal of YEP
Aug. 2000	First meeting of the Task Force on YEP
Oct. 2001	Second meeting of the Task Force on YEP

Feb. & Nov. 2002	Second Independent Appraisal of YEP
2002	Sub-group on feasibility of use of single loading dose of oral antibiotics for treatment of yaws cases which concluded that single dose oral antibiotic is not feasible.
July 2002	Third meeting of the Task Force on YEP
May 2003	First meeting of sub-group on sero surveillance among <5 children
July 2003	Second meeting of sub-group on sero surveillance among <5 children
Dec. 2003	Last cases reported from District Mayurbhanj, Orissa and District Vizianagaram, Andhra Pradesh
Jan. 2004	A team consisting of senior dermatologist from central government hospitals deputed to verify the cases from Orissa and Andhra Pradesh
Jan- Feb 2004	Third Independent Appraisal of YEP
2005 & 2006	Fourth Independent Appraisal of YEP
July 2005	Fourth Task Force Meeting on YEP
April 2006	Expert Group Meeting to discuss the status of Yaws Elimination
May 2006	Fifth Task Force Meeting on YEP: recommended "Declaration of Yaws Elimination from India"
Sept. 2006	India formally declares elimination of Yaws

