# EPIDEMIOLOGY OF LEPROSY

Vijay Bhagat

# LEARNING OBJECTIVES

1. To learn through the ancient traces of leprosy.

4. To understand the clinical, diagnostic and special features of leprosy

2. To understand the burden of leprosy (Global-National-Regional).

5. To understand methods for Prevention, Control- Elimination of leprosy.

3. To learn the applicability of principles of epidemiology in day-to-day practice.

6. To summarize the take home messages.

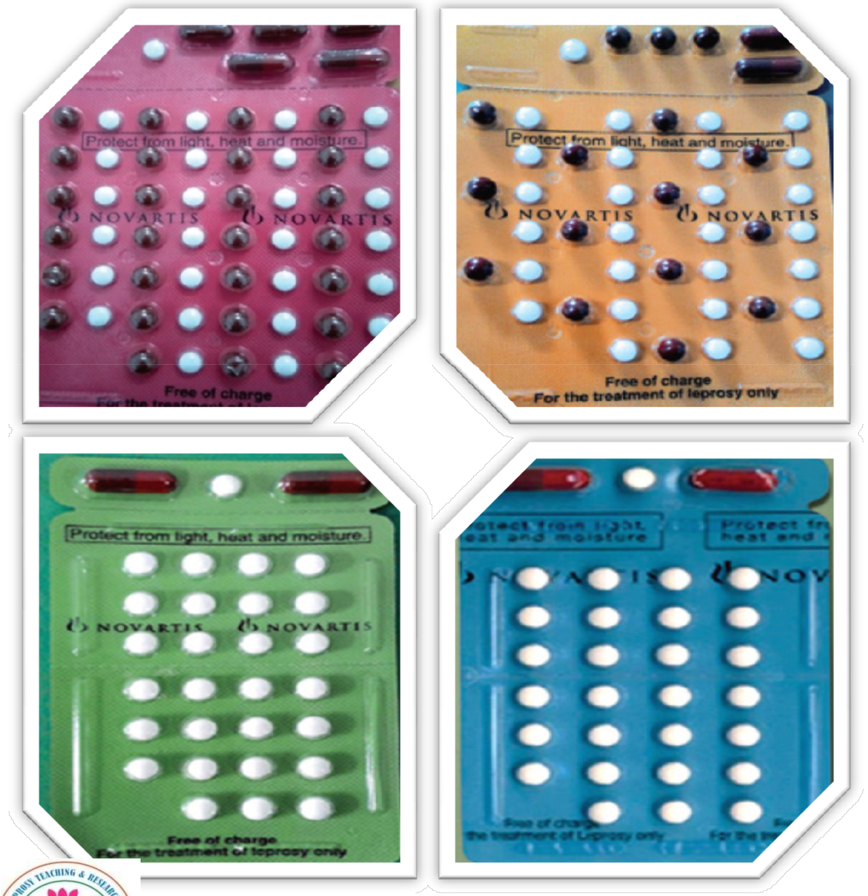
# ANCIENT TRACES OF LEPROSY

Yeoli (1400 BC): Leonine facies on clay jars
*Sushruta samhita* (600 BC): Leprosy facies
Smith & Derry (500 BC): Bony changes

GHA Hansen (1873): M. leprae.
Schaffer Exp. (1897): Nasal discharge
Faget (1941): Effectiveness of Promin

Cochrane (1949): Effectiveness of dapsone
1981: WHO MDT
1997: WHO ROM (single lesion)

# ANCIENT TRACES OF LEPROSY




2001: Whole genome sequence (TN Strain)
Grosset (2001): Loss of genes
Shephard (1960): MFP

Pettit (1964): Dapsone resistance
Rees (1970): Efficacy of rifampicin
1971: M. leprae in 9 branded armadillo

Liu (2004): Pseudo genes
Sharma (2007): MW (MIP) vaccine trial.
Han (2008): M. lepromatosis

# LEPROSY AS IN EPIDEMIC

- **Natal –** SA (1843): 2 men → (3 yrs- exposure to a woman with leprosy) → 200 cases (50 yrs)
- **Memel – E. Germany (1850-80):** Russian woman (domestic servant) → 77 cases
- **Lousiana – US (1866):** French woman (died of leprosy) → Many family members
- **Cape Breton – Canada(1881):** A 52 yrs/F leprosy → 11 family members
- **Nauru (1910-27):** native of an island → Mainland

# Global leprosy situation - 1972

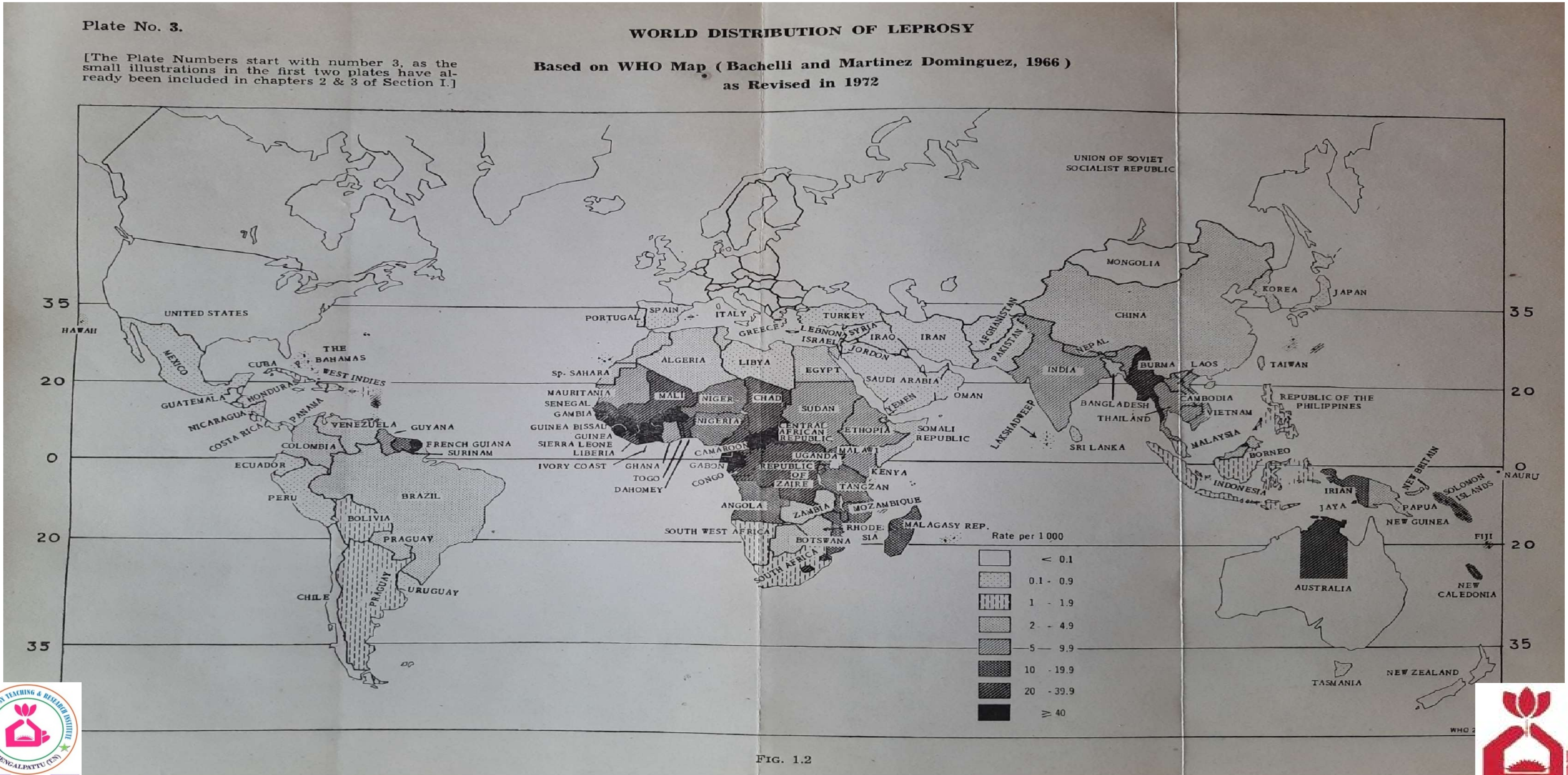
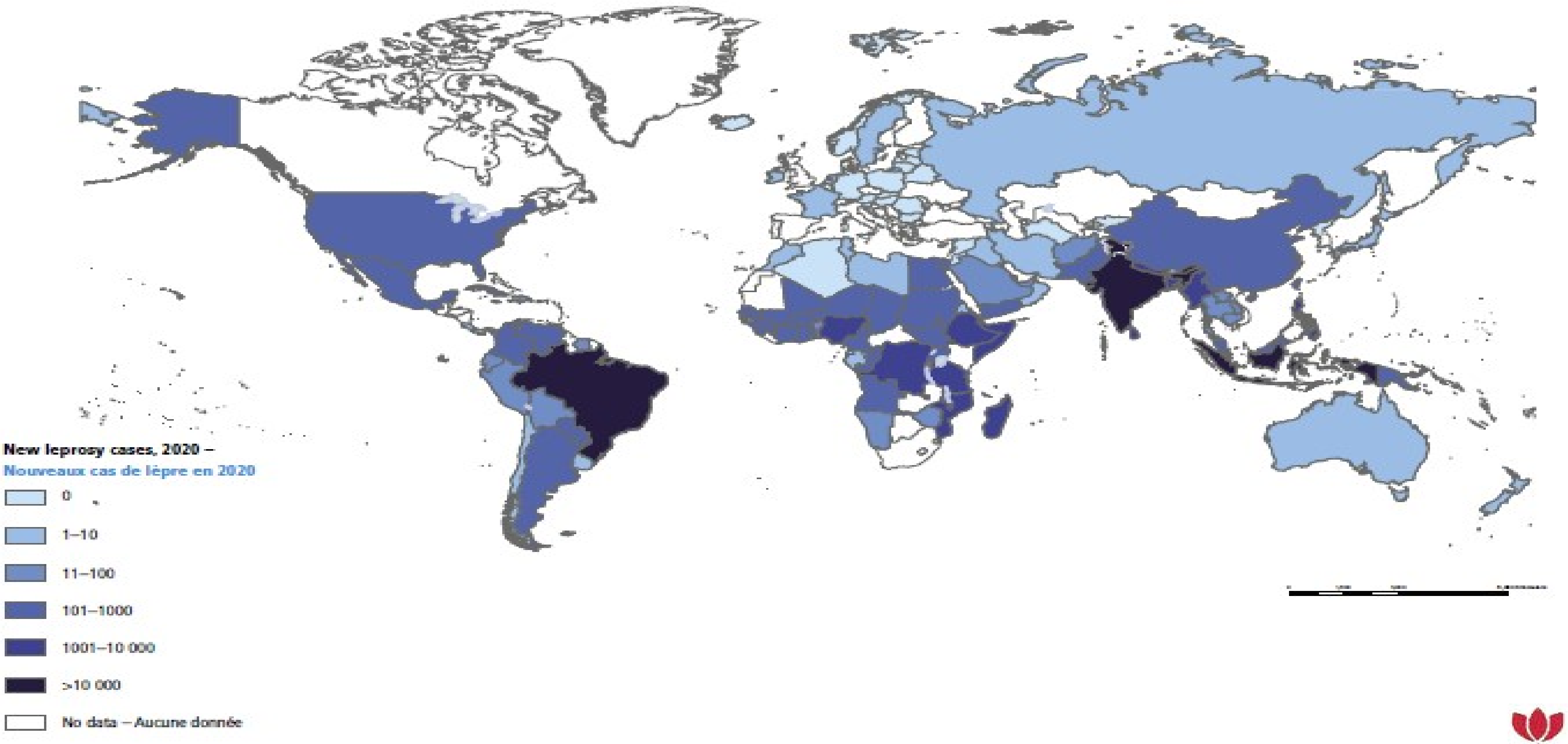


FIG. 1.2

# GLOBAL LEPROSY SITUATION

Source: WHO/WER/Sept.2021;36:96;421-444.



# 23 GLOBAL PRIORITY COUNTRIES

1. Angola. 2. Kiribati
3. Bangladesh 4. Madagascar

5. Brazil 6. Mozambique
7. Comores 8. Myanmar

9. Côte d'Ivoire 10. Nepal
11. D R Congo 12. Nigeria

13. Egypt 14. Philippines
15. Ethiopia 16. South Sudan

17. **India** 18. Sudan
19. Sri Lanka 20. Indonesia

21. UR of Tanzania
22. Somalia 23. FS Micronesia

# 23 Global Priority countries

| Country | Total cases | G2D cases | Child cases |
|---|---|---|---|
| Angola | 721 | 112 | 116 |
| Bangladesh | 3638 | 252 | 210 |
| Brazil | 27863 | 2351 | 1545 |
| Comores | 478 | | 270 |

| Country | Total cases | G2D cases | Child cases |
|---|---|---|---|
| Madagascar | 1283 | 255 | 96 |
| Mozambique | 2220 | 435 | 211 |
| Myanmar | 2488 | 298 | 105 |
| Nepal | 3844 | 254 | 293 |

| Country | Total cases | G2D cases | Child cases |
|---|---|---|---|
| Côte d’Ivoire | 567 | 6 | 128 |
| DPR Congo | 3032 | 317 | 158 |
| Egypt | 537 | 47 | 26 |
| Ethiopia | 3201 | 411 | 507 |

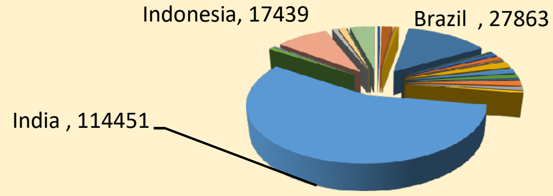
| Country | Total cases | G2D cases | Child cases |
|---|---|---|---|
| Nigeria | 2424 | 369 | 276 |
| Philippines | 2122 | 37 | 99 |
| Somalia | 2425 | 60 | 35 |
| South Sudan | 1152 | 262 | 120 |

| Country | Total cases | G2D cases | Child cases |
|---|---|---|---|
| FS Micronesia | 144 | 1 | 46 |
| India | 114451 | 2761 | 7859 |
| Indonesia | 17439 | 1121 | 2009 |
| Kiribati | 136 | 3 | 37 |

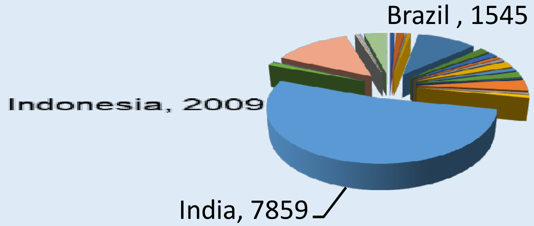
| Country | Total cases | G2D cases | Child cases |
|---|---|---|---|
| Sri Lanka | 1658 | 91 | 176 |
| Sudan | 478 | 64 | 13 |
| UR of Tanzania | 1613 | 166 | 53 |

# GLOBAL LEPROSY INDICATORS: HIGH PRIORITY COUNTRIES

1. New cases detected (2019)
Total: 202185
23 High priority countries: 193840 (95.9%)
WHO Regions: ↓ all regions except AMR




2. Child Cases (2019)
Total: 14981
23 High priority countries:
WHO Regions: ↓ all regions except AMR




3. G2D cases
Total: 10813
23 High priority countries: 9795 (90.6%)
WHO Regions: ↓ all regions except AMR

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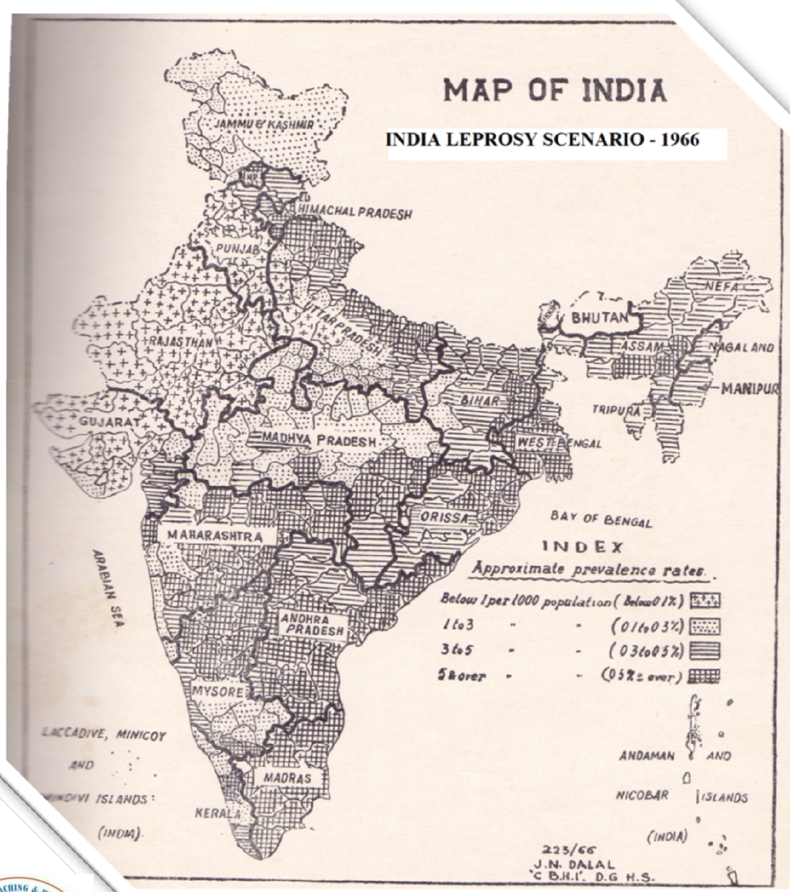
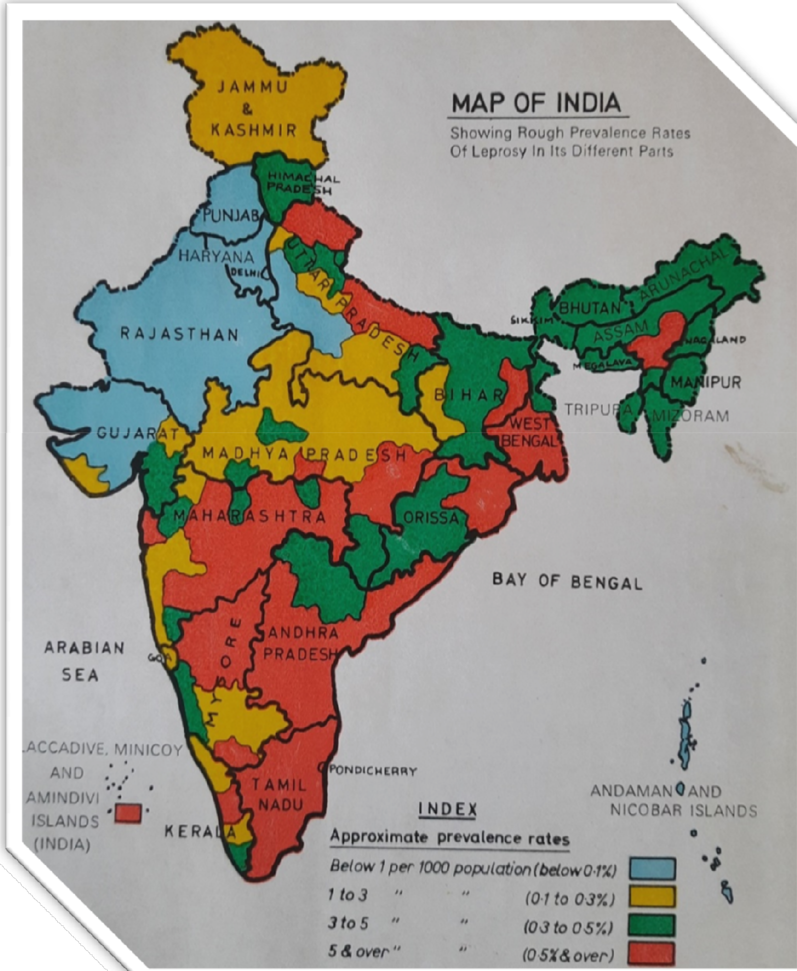
# TOP 3 HIGH BURDEN COUNTRIES

| Rank | Country | New Cases | Child cases | G2D |
|---|---|---|---|---|
| 1. | India | 65147 (69.08%) | 3753 (65.19%) | 1572 (42.44%) |
| 2. | Brazil | 17979 (19.07%) | 878 (15.25%) | 1504 (40.60%) |
| 3. | Indonesia | 11173 (11.85%) | 1126 (19.56%) | 628 (16.95%) |
| Total | | 94299 (74.02) | 5757 (66.72) | 3704 (51.46) |
| Grand total (countries) | | 127396 (127) | 8629 | 7198 |

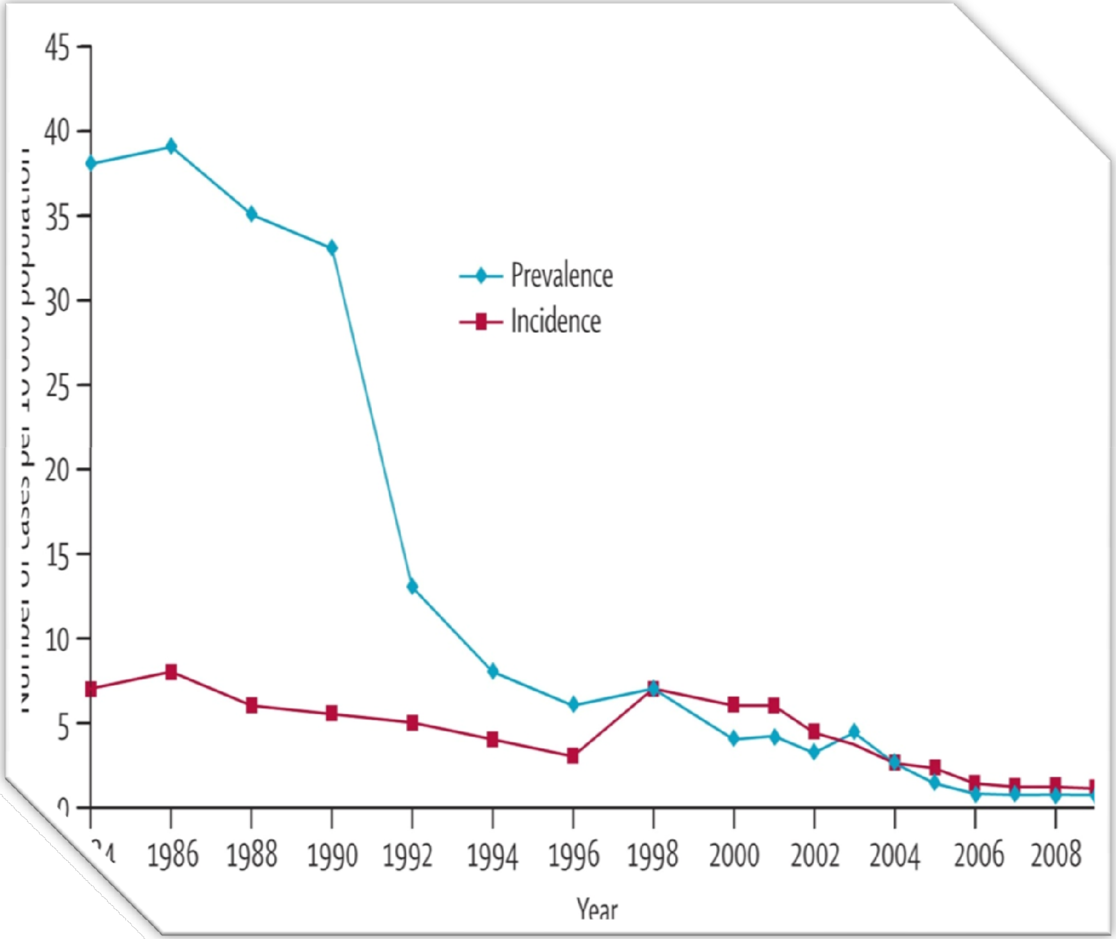
Source: WHO/WER/Sept.2021;36:96;421-444.

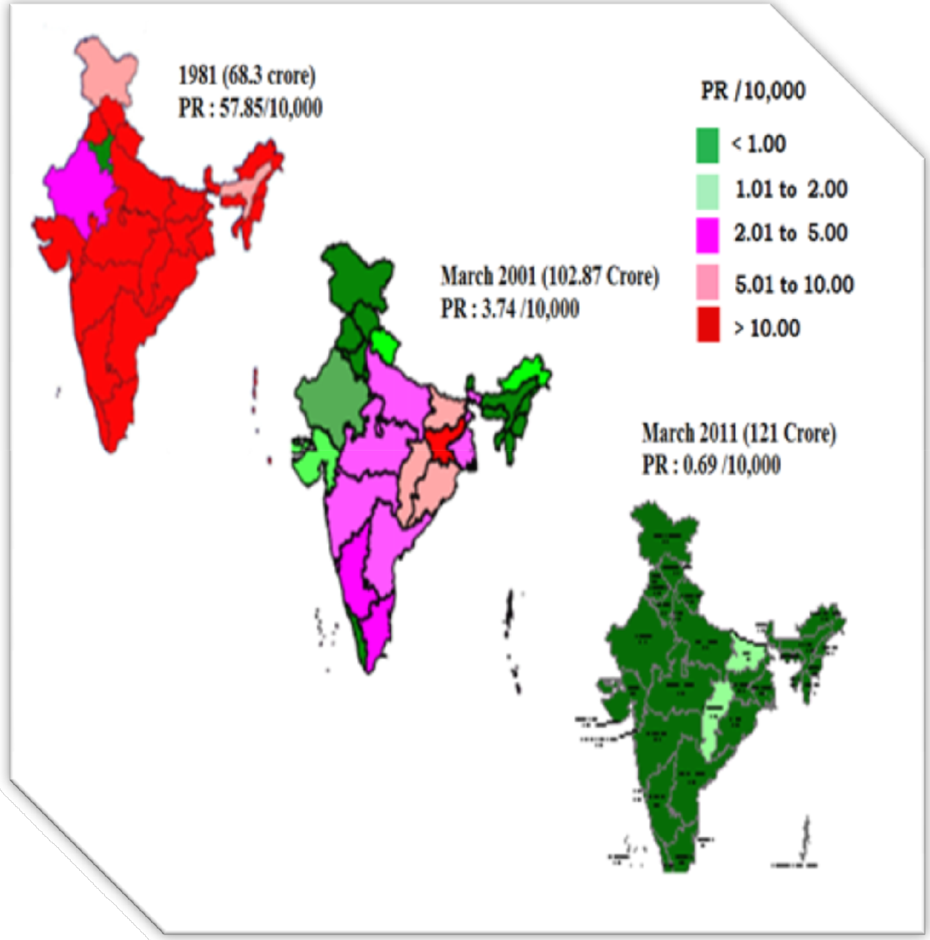
# LEPROSY IN POST INDEPENDENCE ERA

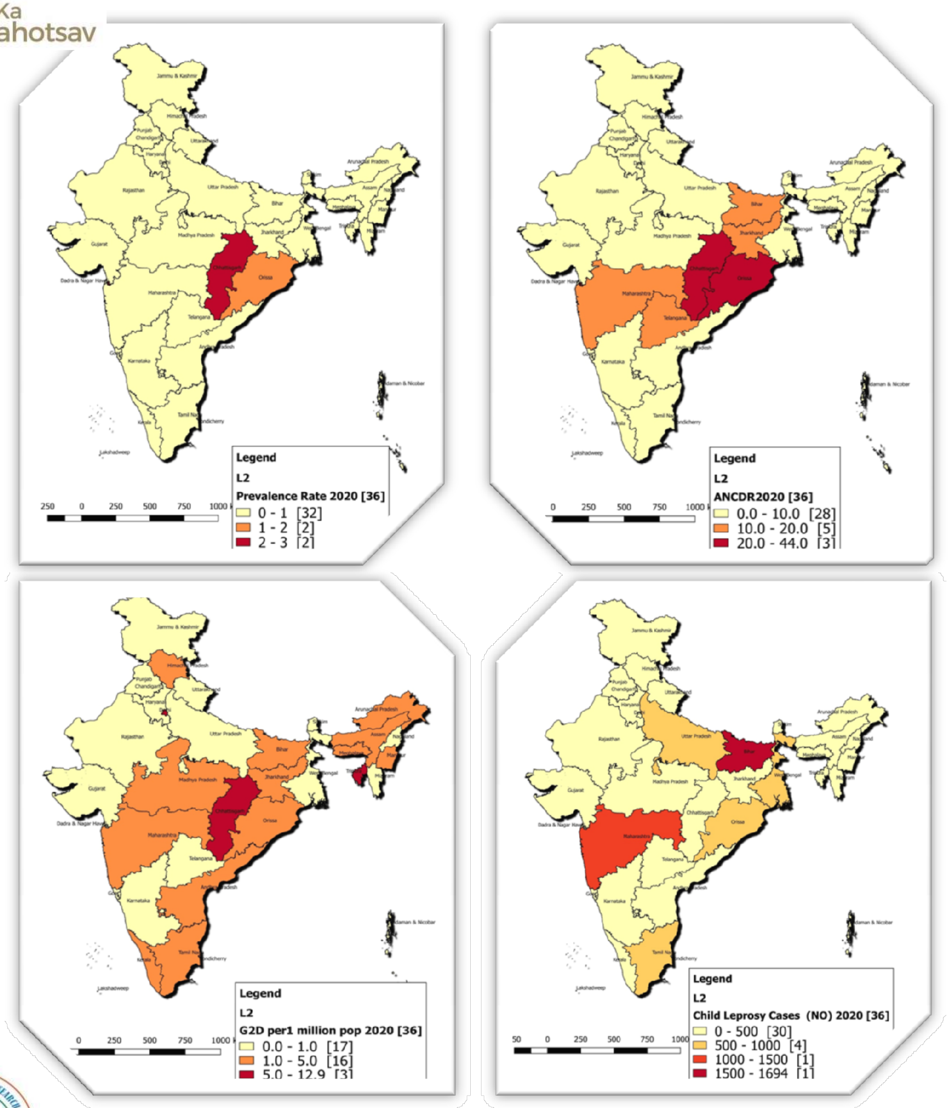


# LEPROSY IN POST INDEPENDENCE ERA



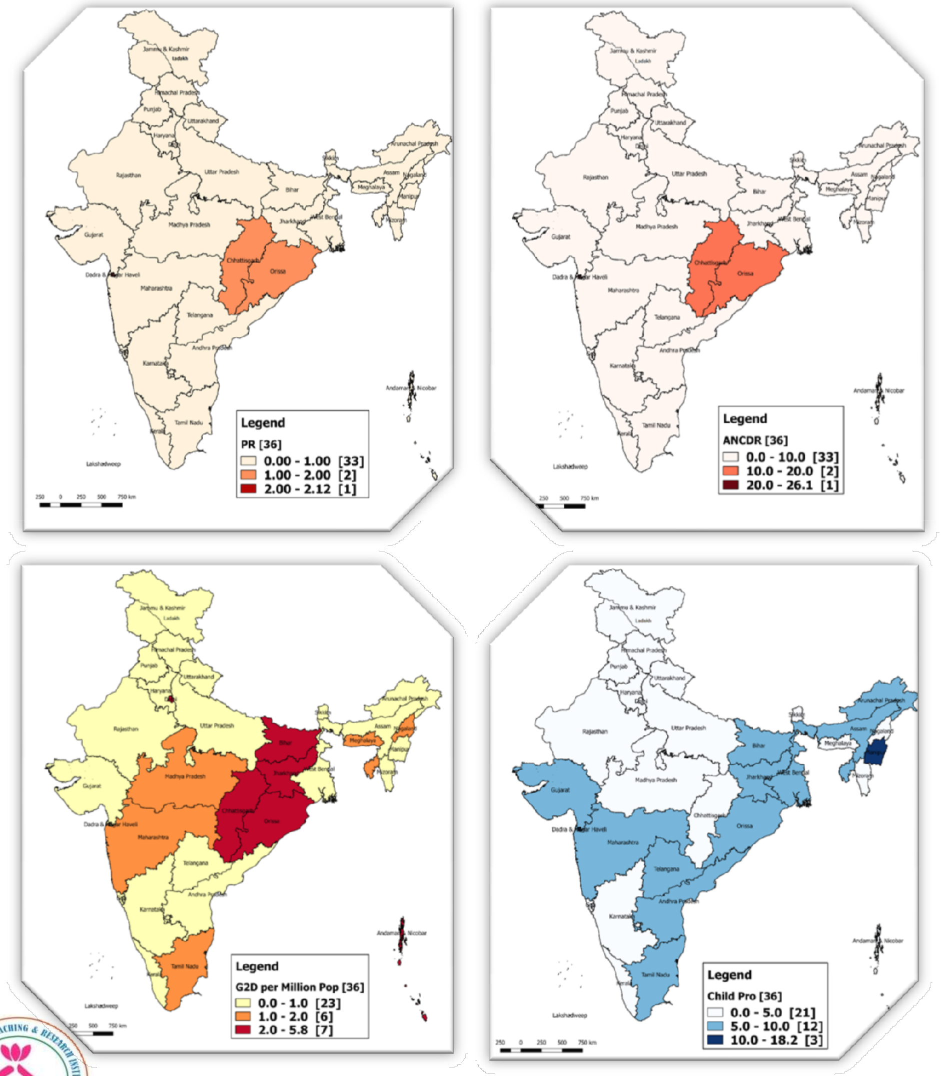






# KEY NLEP INDICATORS (2020)

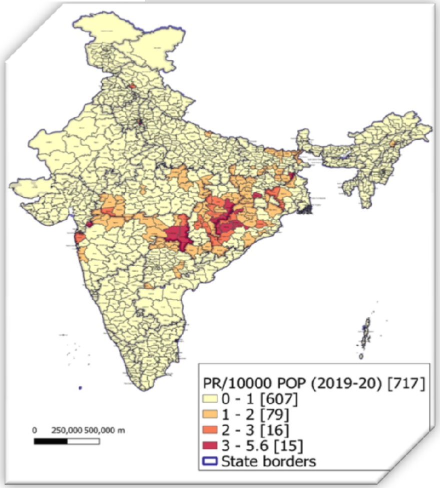
- PR - 0.57,
- ANCDR - 8.13
- Child% - 6.87%,
- G2D - 2.41%,
- G2D- 1.96/ M.

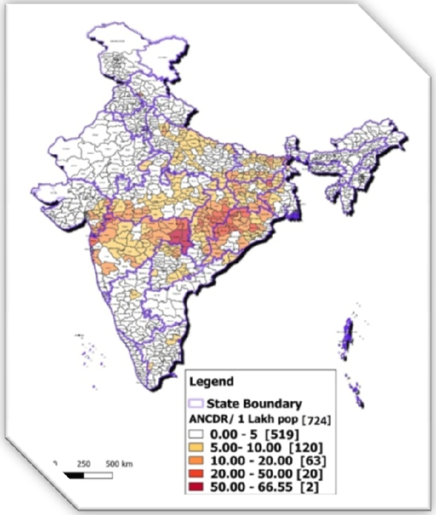
# KEY NLEP INDICATORS (2021)

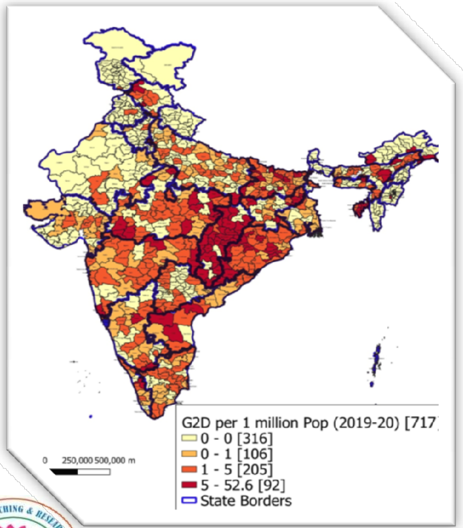


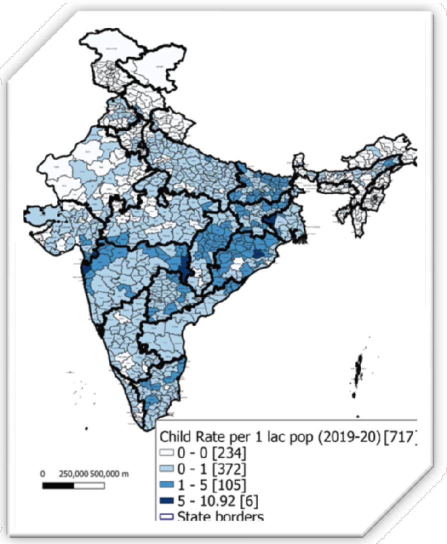

- ANCDR – 4.56
- PR - 0.40
- Child - 5.76%
- G2D - 2.41%
- G2D- 1.10/M.

# LEPROSY STATUS AT DIST. (2020)




| PR | No. of Dist. |
|---|---|
| <1/10000 | 607 (85.9) |
| 1-2/10000 | 79 (11.0) |
| 2-3/10000 | 16 (2.2) |
| >3/10000 | 15 (2.1) |

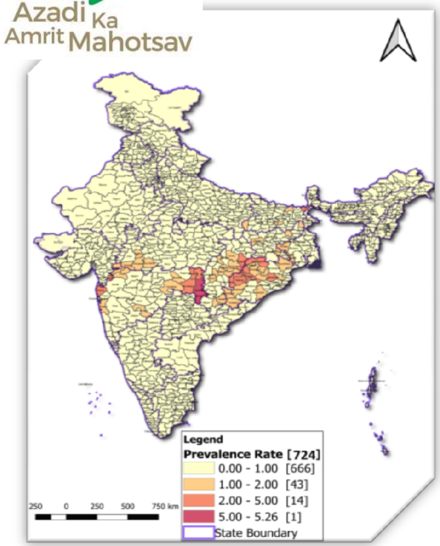
| ANCDR* | No. of Dist. |
|---|---|
| <5/1L | 519 (71.6) |
| 5-10/1L | 120 (16.6) |
| 10-20/1L | 63 (8.7) |
| 20-50/1L | 20 (2.7) |

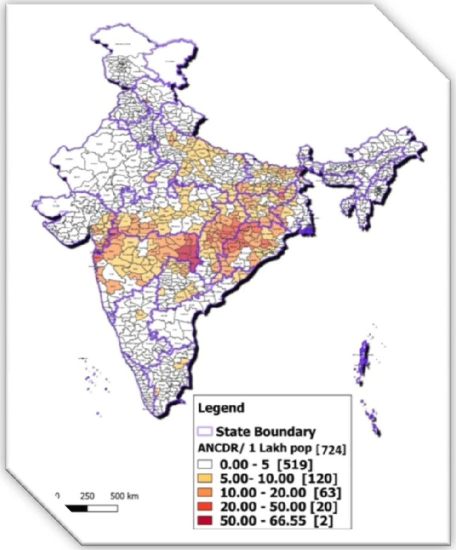
| G2D | No. of Dist. (%) |
|---|---|
| 0-1/M | 422 (58.6) |
| 1-5/M | 205 (28.6) |
| >5/M | 92 (12.8) |

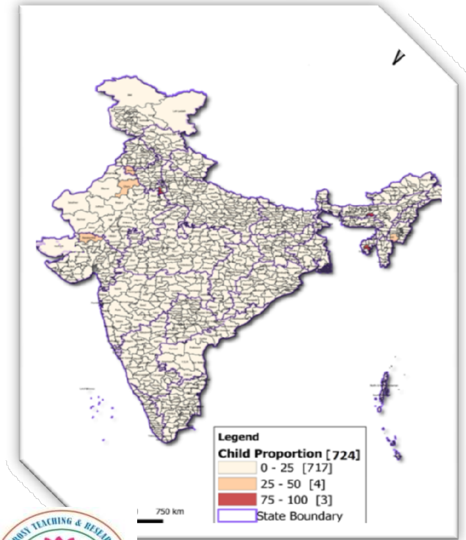
| Children* | No. of Dist. (%) |
|---|---|
| 0-1 | 606 (84.5) |
| 1-5 | 105 (14.6) |
| >5 | 6 (0.8) |

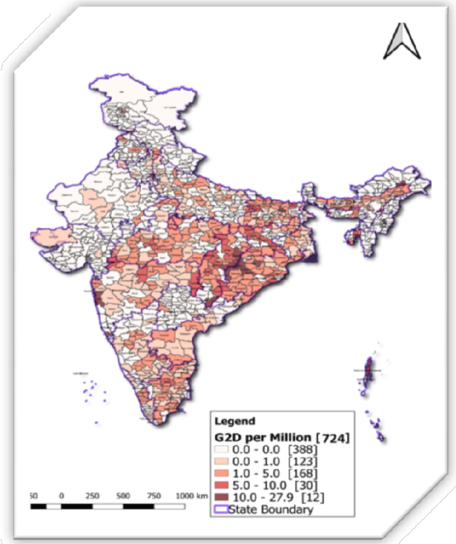
*Per 1L

# LEPROSY STATUS AT DIST. (2021)




| PR | No. of Dist. |
|---|---|
| <1/10000 | 666 (91.98) |
| 1-2/10000 | 43 (5.9) |
| 2-5/10000 | 14 (1.9) |
| >5/10000 | 1 (0.13) |

| ANCDR* | No. of Dist. |
|---|---|
| <5/1L | 519 (71.6) |
| 5-10/1L | 120 (16.6) |
| 10-20/1L | 63 (8.7) |
| 20-50/1L | 20 (2.7) |

| G2D | No. of Dist. (%) |
|---|---|
| 0-1/M | 511 (70.6) |
| 1-5/M | 168 (23.2) |
| 5-10/M | 30 (4.14) |
| >10/M | 12 (1.65) |

| Children | No. of Dist. (%) |
|---|---|
| 0-25% | 717 (99.03) |
| 25%-50% | 4 (0.55) |
| >50% | 3 (0.4) |
| | |

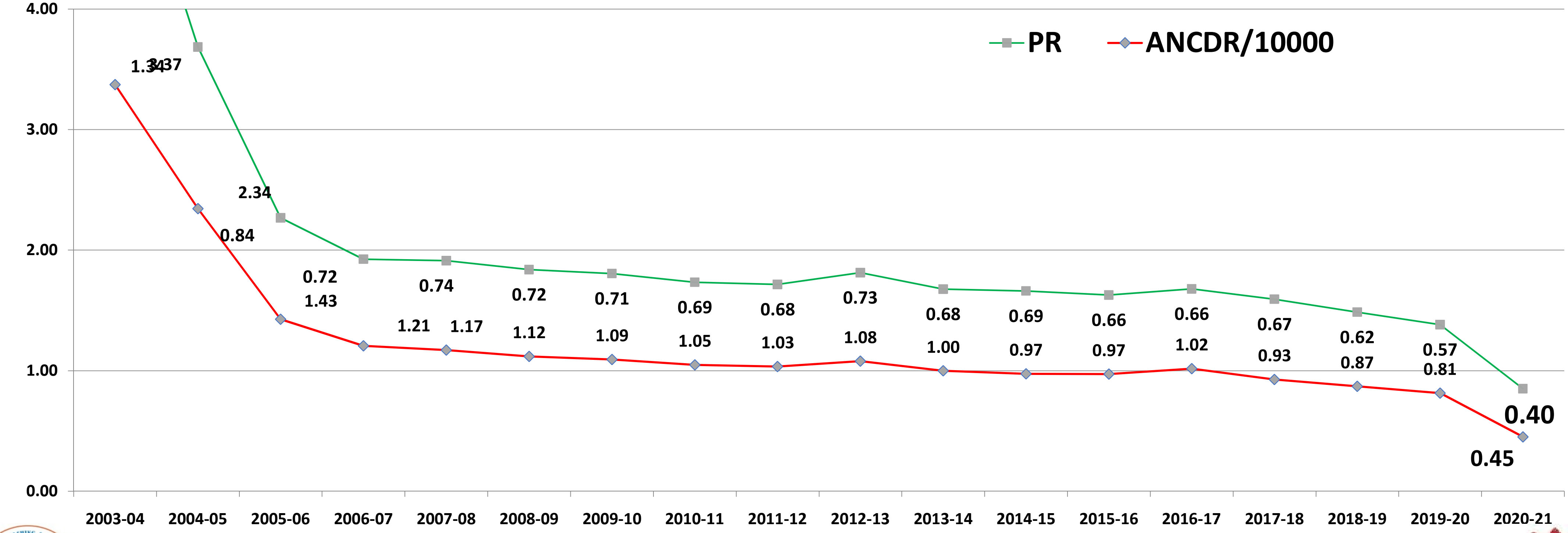
ANCDR>50: Chandrapur & Gadchiroli Dist. of MH

# IMPACT OF COVID-19 PANDEMIC ON LEPROSY SITUATION IN INDIA

| 2019-20 | 2020-21 | IMPACT OF PANDEMIC |
|---|---|---|
| • PR - 0.57 | ➢ PR - 0.40 | ✓ New cases- ↓ 56.98% |
| • ANCDR - 8.13 | ➢ ANCDR – 4.56 | ✓ Child cases – ↓40.67% |
| • Child% - 6.87% | ➢ Child - 5.76% | ✓ G2D cases- ↓ 58.51% |
| • G2D - 2.41% | ➢ G2D - 2.41% | ✓ ↓>50%= 14 states |
| • G2D- 1.96/ M. | ➢ G2D- 1.10/M. | ✓ ↓25-50%= 15 states |
| | | ✓ ↓<25%= 8 states |

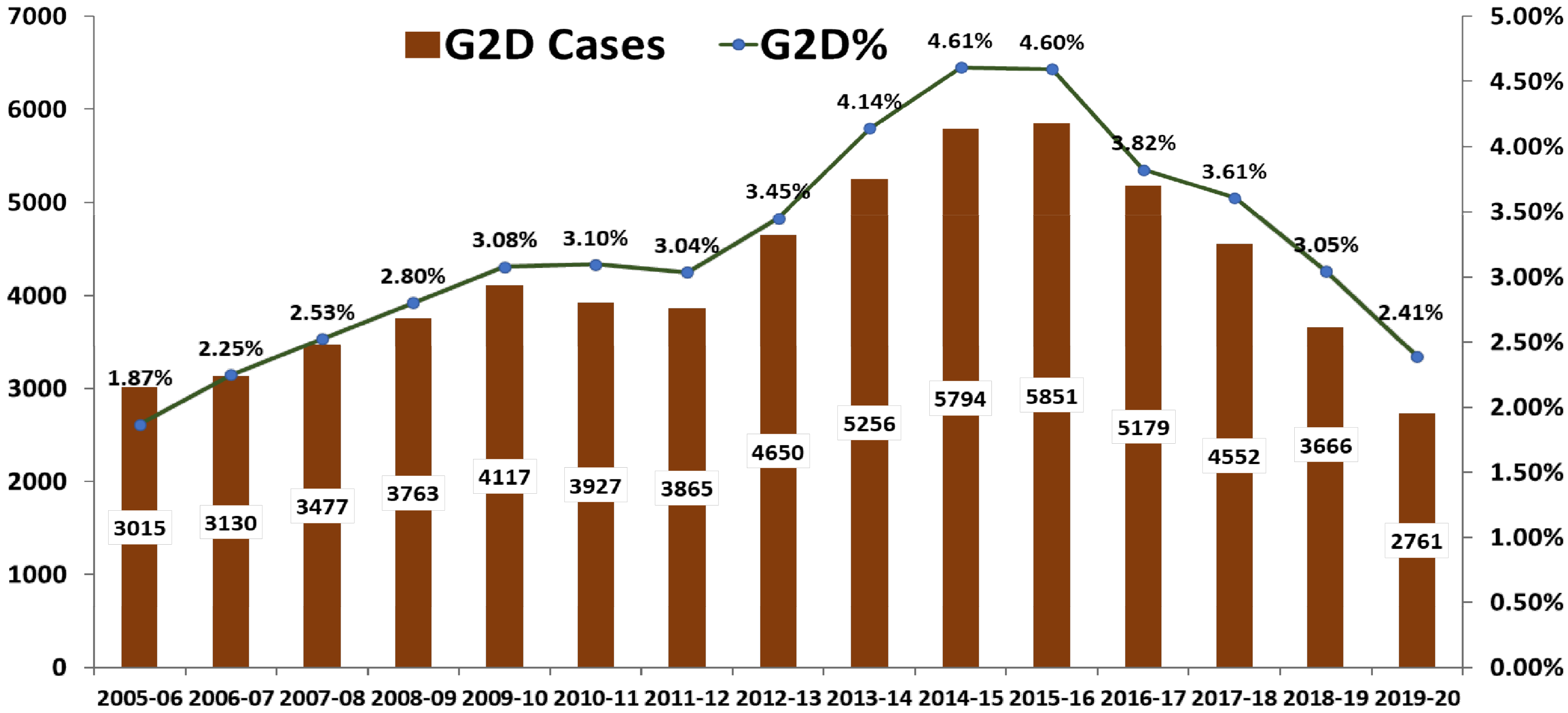
# INDIA : EPIDEMIOLOGICAL TREND IN LEPROSY

## Trend in case detection

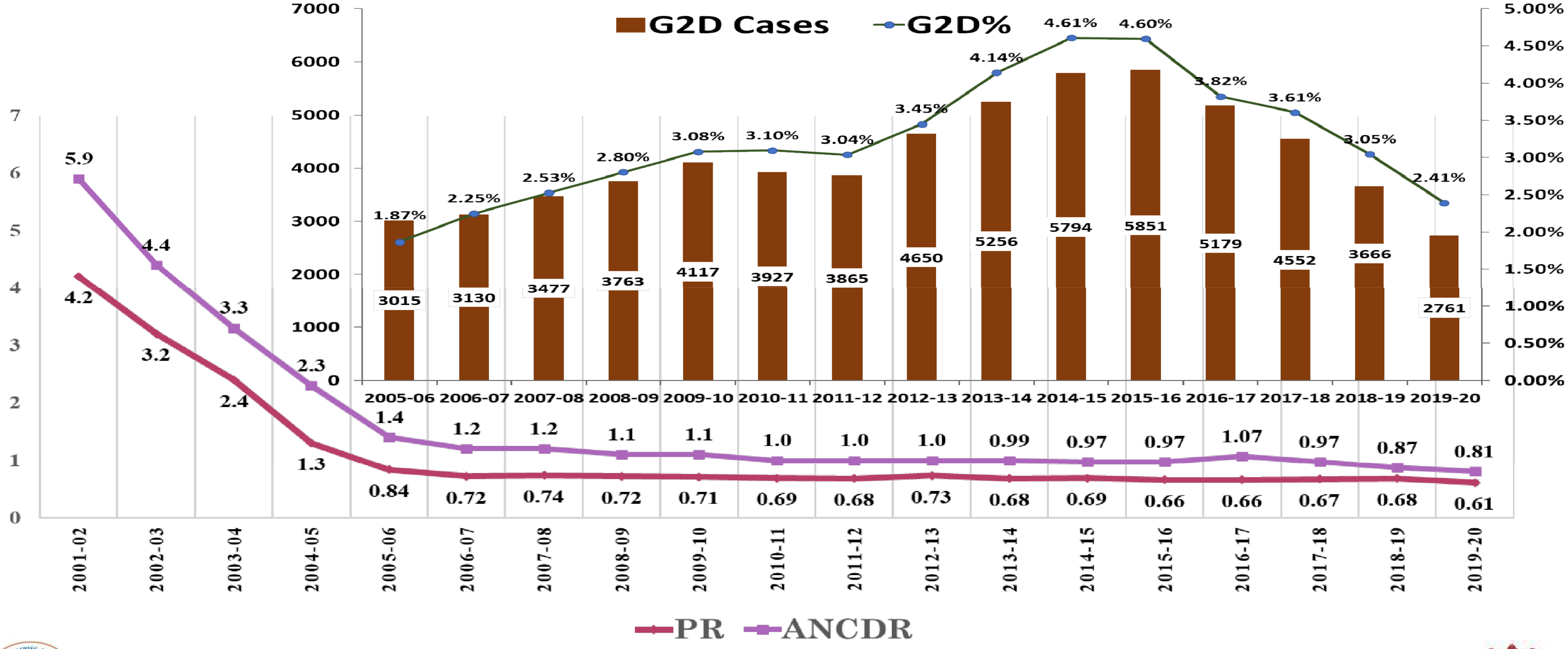


# INDIA : EPIDEMIOLOGICAL TREND IN LEPROSY

## Trend in G2D cases



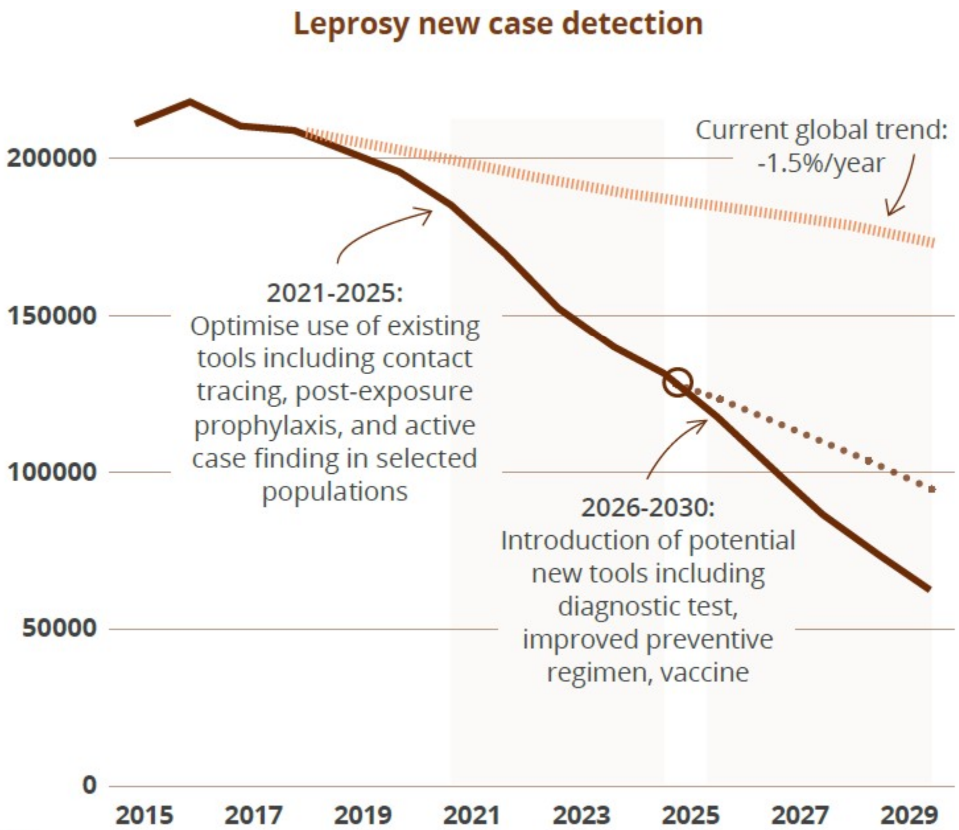
# INDIA : EPIDEMIOLOGICAL TREND IN LEPROSY



# COMMUNITY BASED ESTIMATES

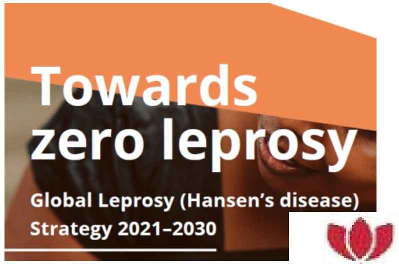
| National Sample Survey 2011-12 | Indian J Med Res 146, Nov 2017, 585-605 |
|---|---|
| ➢Case detected: 126164<br>➢Reported NCDR: 9.27/L pop | ➢Estimated cases: 334615<br>➢Estimated: 27.7 / L pop |
| Reported G2D %: 3.67<br>Reported G2D/Mil: 3.34 | Estimated G2D %: 8.09<br>Estimated G2D/Mil: 11.88 |

# GLOBAL LEPROSY STRATEGY 2021-30




Strategic Pillars

1. Implement integrated, country-owned zero leprosy road maps in all endemic countries
2. Scale up leprosy prevention alongside integrated active case detection
3. Manage leprosy and its complications and prevent new disability
4. Combat stigma and ensure human rights are respected



# WHO IMPACT INDICATORS - 2030

| Indicator | 2019 (Reported) | 2020 (Projected) | 2023 (Milestone) | 2025 (Milestone) | 2030 (Target) |
|---|---|---|---|---|---|
| No. of countries with zero autochthonous cases | 34 | 50 (26%) | 75 (39%) | 95 (49%) | 120 (62%) |
| No. of new cases detected | 202,256 | 184,000 | 148,000 | 123,500 | 62,500 |
| Rate (Per Mil) of new cases with G2D | 1.40 | 1.30 | 0.92 | 0.68 | 0.12 |
| Rate (Per Mil Children) of new child cases | 7.83 | 7.81 | 5.66 | 4.24 | 0.77 |

# INDIA: MILESTONES IN LEPROSY CONTROL

- Before independence: BELRA
- After independence: HKNS
- 1955: National Leprosy Control Prog.

- 2012: Special action plan (206 Dist.)
- 2014: USIS
- 2015: LCDC

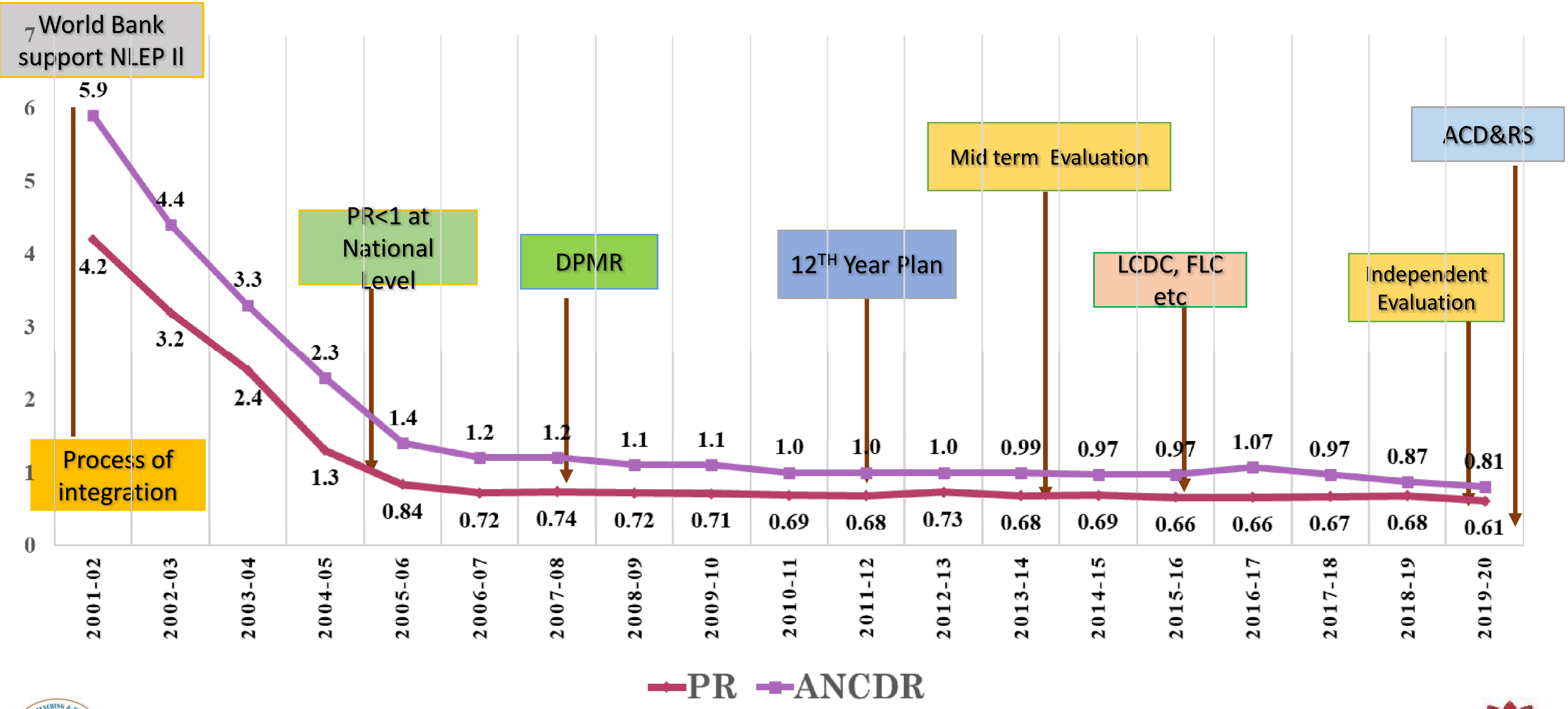
- 1983: Multidrug therapy (MDT)
- 1983: National Leprosy Eradication Prog.
- 1999: ROM therapy

- 2016: SLAC → SLEC (2018)
- 2017: Nikusth, ABSULS
- 2018: Independent evaluation- NLEP

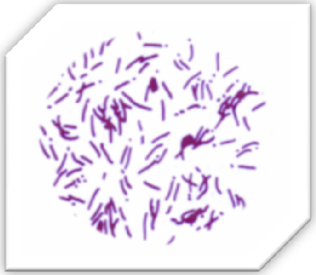
- 2002: Simplified information system
- 2005: Elimination of Leprosy at National Level & Integration of NLEP into GHC

- 2020: ACDRS
- 2022: LCDC

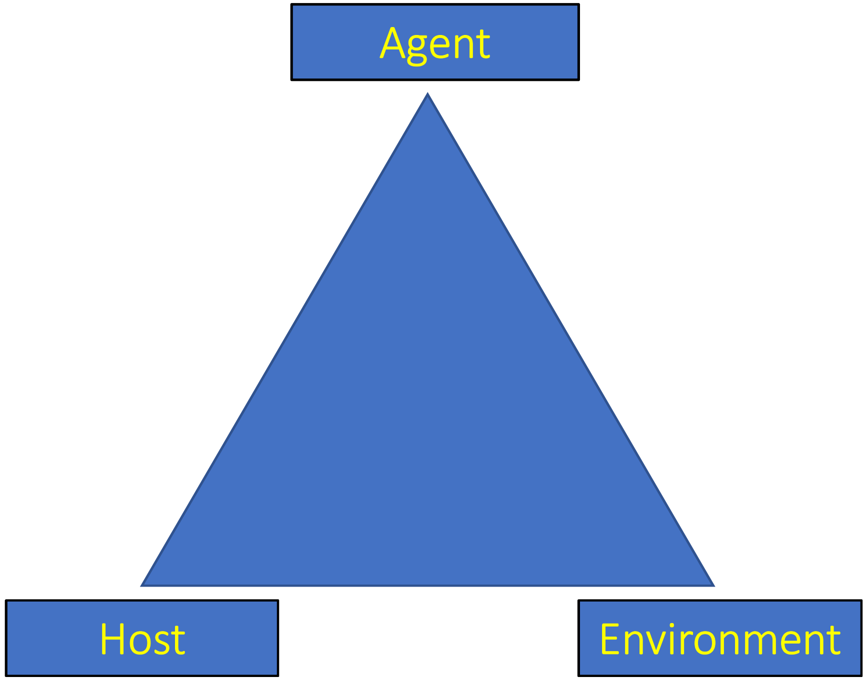
# NLEP STRATEGIES & DISEASE TREND



# DETERMINANTS OF LEPROSY



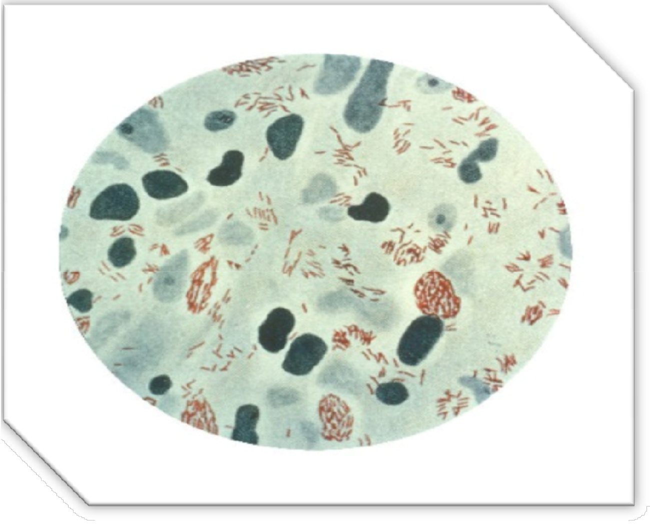
Agent
Host
Environment



# AGENT CHARACTERISTICS

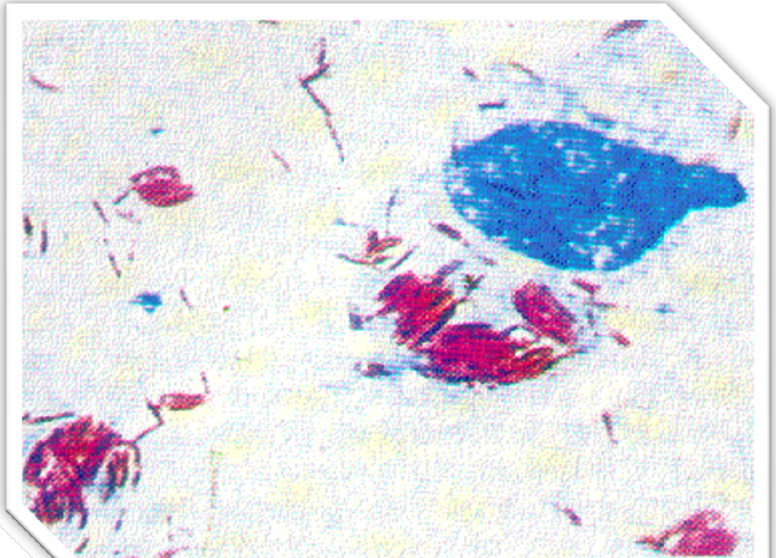
- Leprosy is caused by Mycobacterium leprae. It is an obligate intracellular Bacteria.
- It is an acid-fast bacillus and is stained red/pink by carbol fuschin.

# MYCOBACTERIAL CHARACTERISTICS



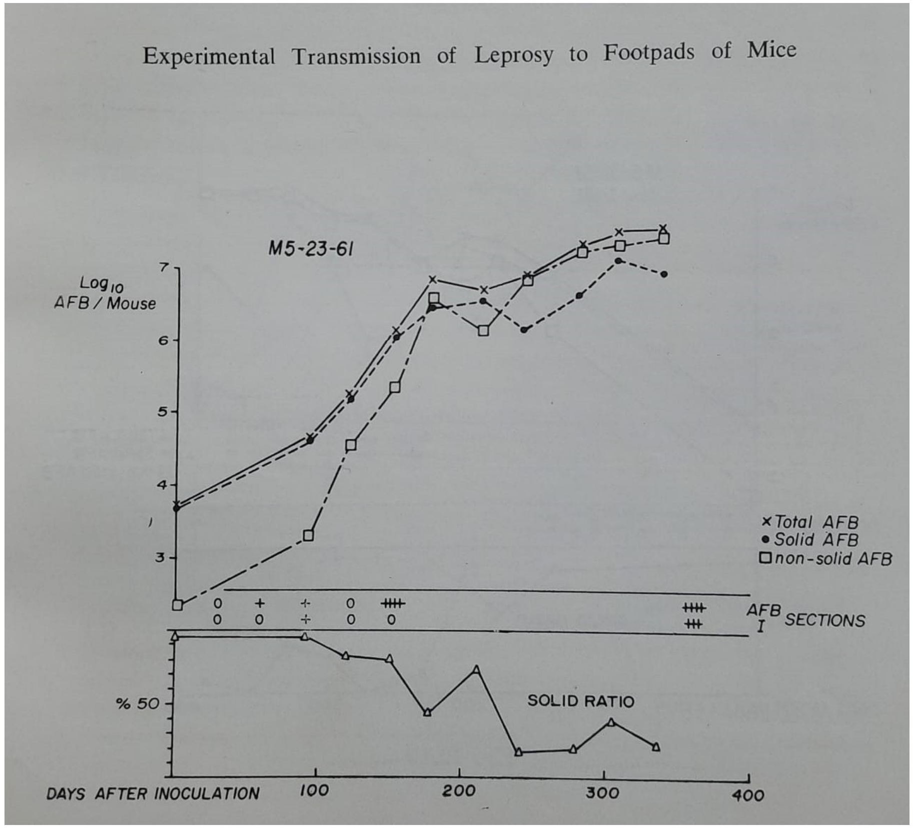
- 1-8 um in length, 0.2-0.8 um in diameter
- Pleomorphic, aerobic, non motile, non spores forming
- Straight or slide curved
- Favorable temperature 27-30 C
- Non-toxin producing bacterium.
- Slow growing – 12-14 days to divide
- Non Cultivable in artificial media
- Low Antigenicity – Limited body reaction

# MYCOBACTERIAL CHARACTERISTICS


M. leprae, singly and in globi

- Schwann cell or occasionally axons
- Obligate intracellular
- Multiplies inside macrophage
  - Skin (Histiocytes)
  - Nerves (Schwann cells).

# GROWTH OF M. LEPRAE IN MFP




I. Lag Phase

II. Log Phase

III. Plateau phase

Inoculum ($5*10^3$)…………………………………..Day 1

First demo of growth ……………………….….Day 90-120

Log phase (Avg. Gen. time 12-13 days)..Day 120-180

Plateau phase ($5*10^6$)……………………….Day 180 onwards

# SOURCES OF INFECTION

- **Humans:**
  - Open case of leprosy: Nasal secretions, oral/nasal ulcers
  - Skin lesions: Ulcerated, sweat & other secretions
- **Extra humans:**
  - Natural infection in Armadillos, Mangabey monkeys, Chimpanzees.
  - Zoonotic disease ??

# INFECTIVITY

- Highly infective but low pathogenicity
- Infective material
  - Dried secretion → 9 days
  - Moist soil → 46 days
- Active case to turn Non infectious
  - Dapsone → 90 days
  - Rifampicin →3 weeks
  - Rifampicin (nasal spray) → Eradication of bacilli

# INFECTIVITY

- Infectivity: Nodular leprosy >>>> Anaesthetic
- A lepromatous case--→ 20-70 L Bacilli per gram of leproma

## Infectivity among contacts

| Studies | Type of exposure (Index case) & incidence of leprosy among contacts | | |
|---|---|---|---|
| | Lepromatous | Non lepromatous | No leprosy case |
| Lowe et al | 1 case per 3 families | 1 case per 20 families | 1 case per 40 families |
| Boenjamin | 9.6% | 2.4% | |
| Kluth | 2.6% | 0.2% | |
| **Attack rate: Number of cases per 1000 contacts per year** | | | |
| Doull et al (1942)* 15 yrs | 6.2/1000/year | 1.6/1000/year | 0.8/1000/year |
| Guinto et al (1954)* | 4.4/1000/year | 1/1000/year | 0.8/1000/year |
| Ali et al (1966) | 17.5/100 per year | 5.9/1000/year | |
| Noordeen (1978) | 48.0/1000/year | 17.79/1000/year | |
| Noordeen (1978) | 67.14/1000/year | 34.10/1000/year | |

# FACTORS A/W INFECTIVITY

- Tuberculoid cases during reaction: Small No. of AFB in deep tissues

Wheate et al (1967):

Non lepramatous→ 80% bacteriological positive →46% →37% (3-9 months)→17% (≥9 months)

- Effect of Isolation

Dharmendra et al (1945): Practiced isolation → < PR, < % Lepramatous

- Inapparant/missed open cases: Lepramatous & Tuberculous both

Subclinical cases among contacts:

- M. leprae in SSS among healthy person Figuredo (1950), Ghosh (1973)
- Infectivity of Tuberculoid cases << Lepramatous cases

# TRANSMISSION OF INFECTION

- Leprosy is transmitted from untreated leprosy affected person to a susceptible person through
  - Droplets, mainly via the respiratory tract
  - Contact transmission (lesions over feet)
  - Other routes (direct inoculation)

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# INCUBATION PERIOD

- 2-5 years (Avg.)
  - ↑ lepromatous, ↓ tuberculoid
  - As early as among 3-6 week infant
  - As late as among 70-80 year old
- Failure to recognize early signs

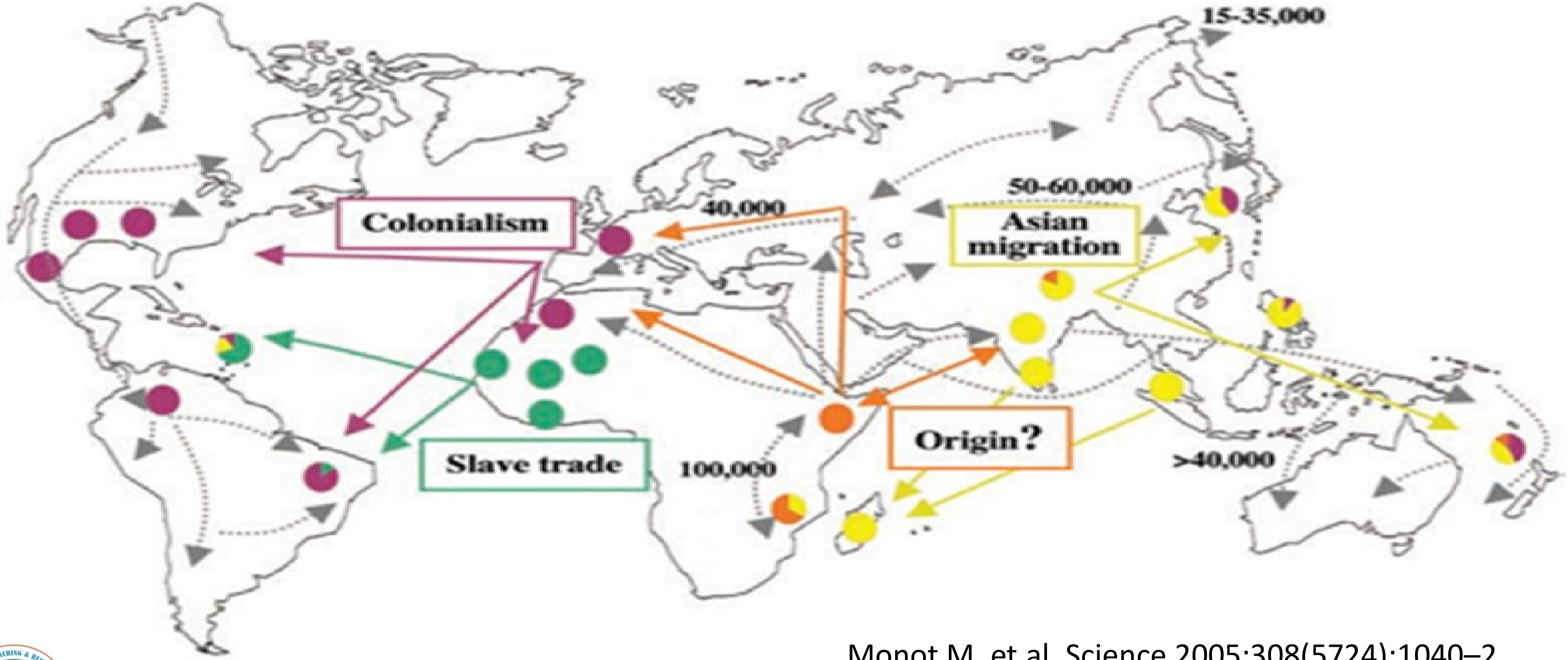
# MODES OF TRANSMISSION

- **Source of infection:** Untreated leprosy affected person (Human beings) is the only known source for M leprae.
- **Portal of exit:** Respiratory tract (nose), ulcerated skin lesion
- **Contacts:**
  - MB contact 10 times ↑than that of gen. pop.
  - MB Case contacts → 4-12% (5 yrs)
  - Transmission early period (till sought t/t)

# TRANSMISSION DYNAMICS

- Transmission by contact
  - Direct Vs indirect contact
  - Closeness of contact
  - Degree of intimacy
  - Duration of contact (Dose of infection)
- Transmission by ingestion
- Transmission through insects

# CROSS-BORDER SPREAD OF LEPROSY




Monot M. et.al. Science 2005;308(5724):1040–2.

# HOST FACTORS

- 95% population naturally immune to leprosy in India
- Age: Any age (↑ among 20-30 yrs).
  - Endemic regions → High leprosy among children
  - Low prevalent → older adults

Gender: Both the genders (↑males)

Immunity: Infection → Anyone, Disease → Immunity

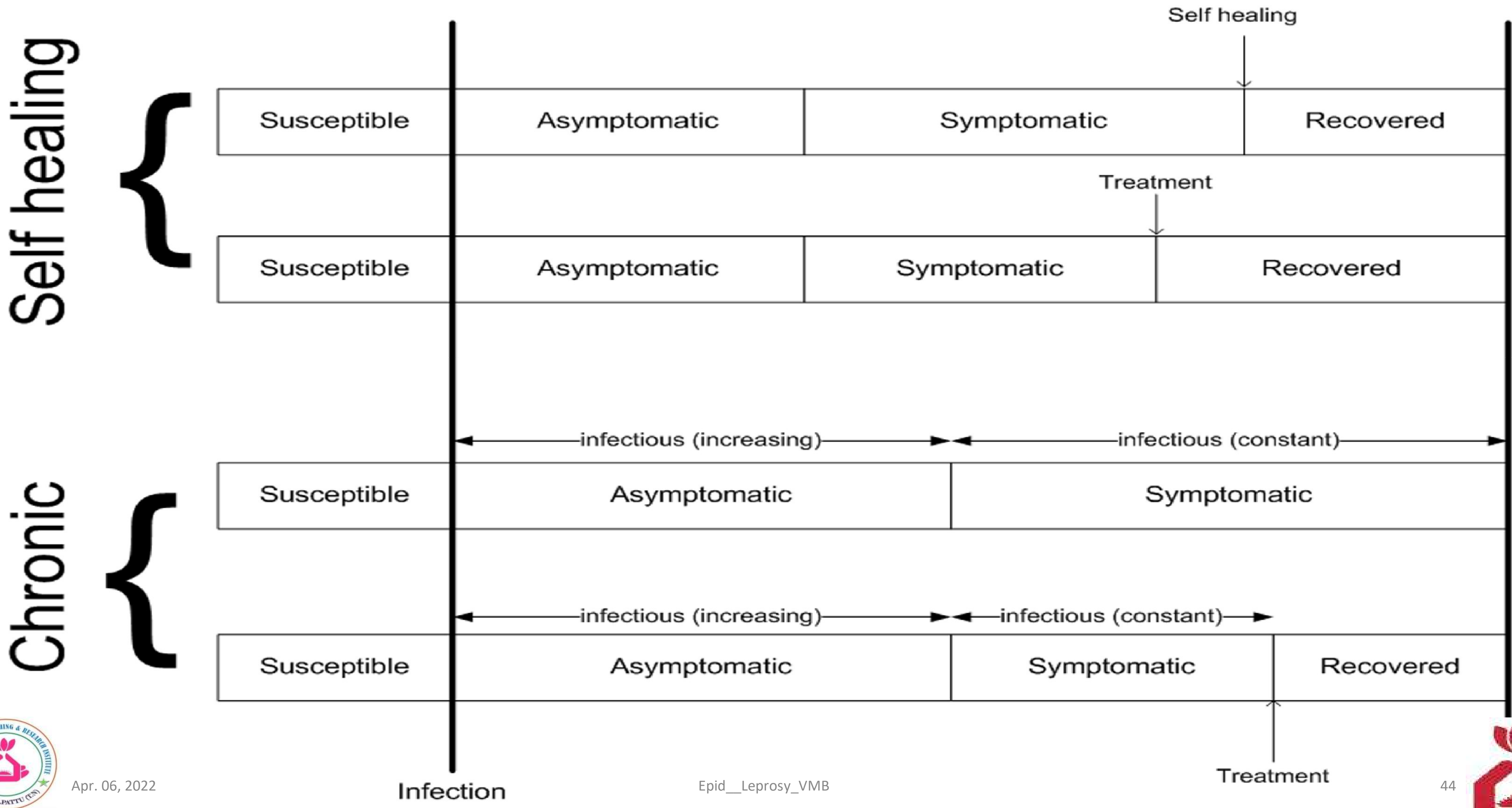
Viable M. leprae in environment (Soil & Water)*

*Mohanty PS et al. J Dermatol Venereol Leprol 2016;82:23-7.

# FACTORS INFLUENCING SUSCEPTIBILITY

- Age: Children are more susceptible than adults.
- Individual immunity: Nutritional factors may play a role.
- Climate: Leprosy is prevalent in tropical and subtropical climates.

# NATURAL HISTORY OF LEPROSY.



# NATURAL HISTORY OF LEPROSY & ITS CLINICAL CORRELATION

**M. leprae → Subclinical infection →Indeterminate presentation**

| | | | | | |
|---|---|---|---|---|---|
| Immune response | Very good | Strong CMI | Variable CMI | | Deficient CMI |
| Clinical presentation | Spontaneous recovery | Polar Tuberculoid | Borderline | | Polar lepramatous |
| Ridley - Jopling | | TT | BT | BB BL | LL |
| Slit Skin Smear | | Negative | | Positive | |
| WHO- (for MDT) | | Paucibacillary | | Multibacillary | |

# LEPROSY: CHILD BEARING

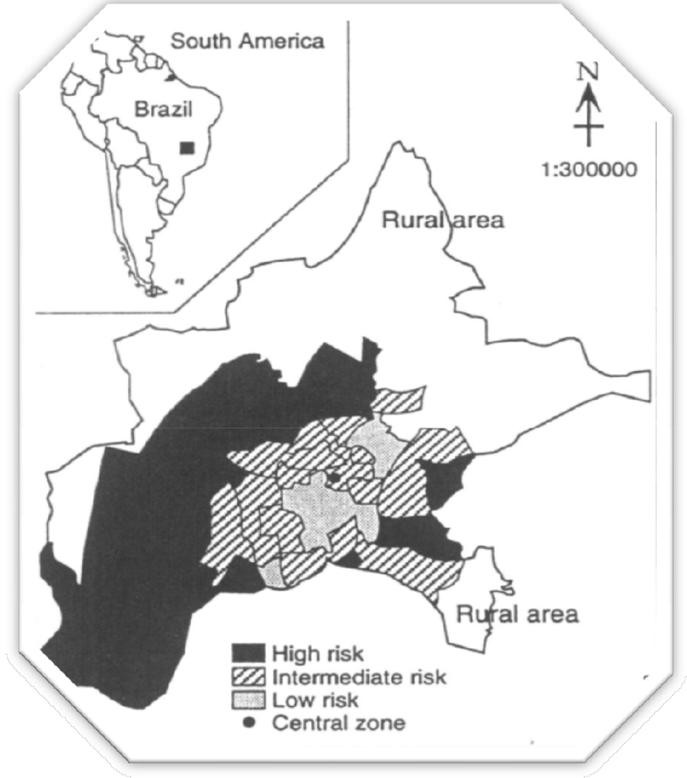
- No ↓fertility of women
- No risk of congenital leprosy to the fetus
- Lack of teratogenicity of standard MDT
- √ breast-feeding infants while mothers on chemotherapy
- Small risk to mother for worsening leprosy in pregnancy → controllable
- Risk of reactions → medically manageable
- Very small risk to fetus due to drugs for reaction/neuritis → manageable
- Mother is disabled → difficulty in childcare

# ENVIRONMENTAL FACTORS

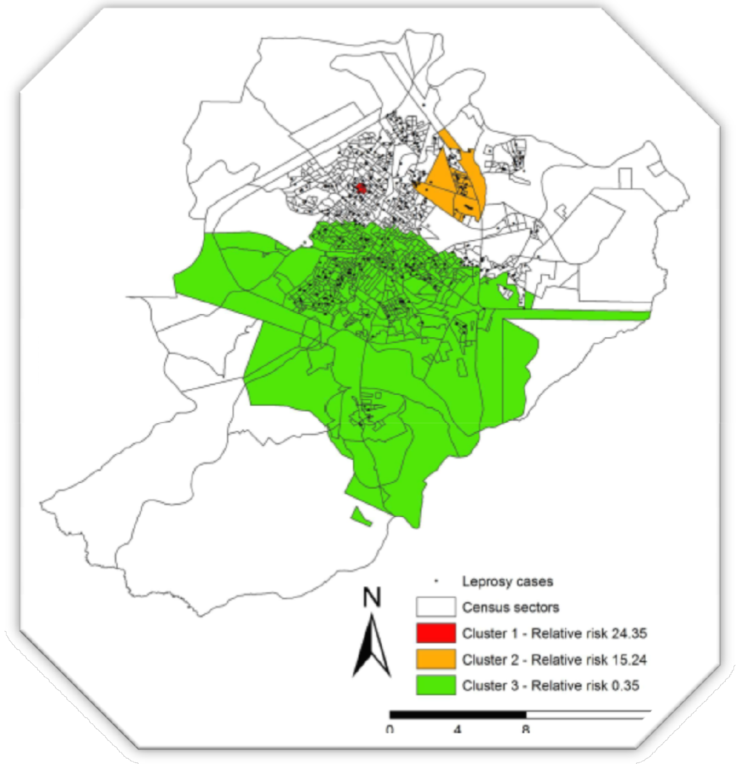
- Socio-Economic Factors:
- Poverty associated Factors:
  - Overcrowding, lack of education
  - Lack of hygiene,
  - Lack of ventilation
- Improved socio-economic conditions
- Migration*:* Affecting elimination & of spread of leprosy
- Fear of Stigma & discrimination

# URBAN LEPROSY

Goiania, Brazil




Martelli et. Al. Bull WHO 1995:73(3):315-19.

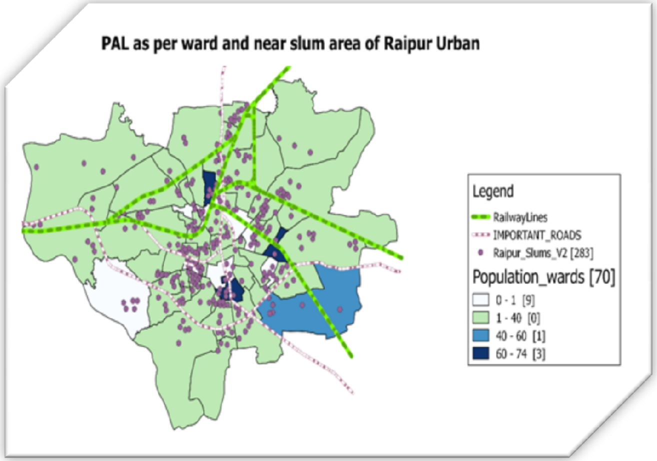


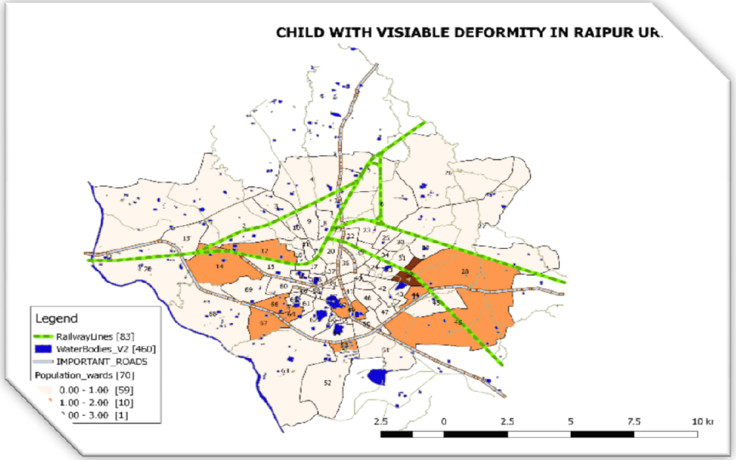

Sao Paulo, Brazil

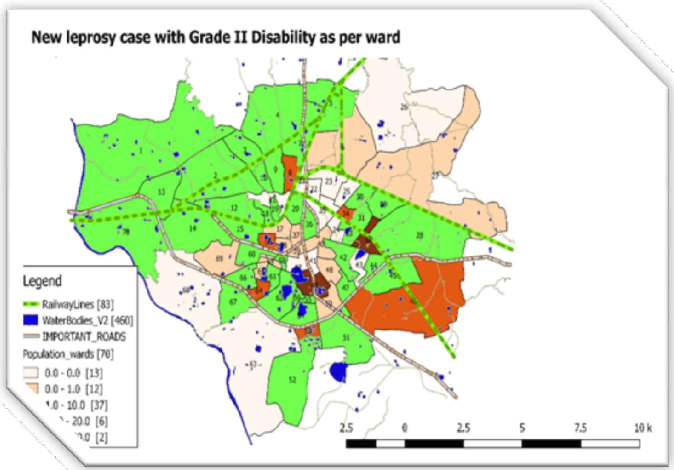
Ramos ACV. PLoS Negl Trop Dis 11(2):2017

Urban periphery 5.3 times higher risk

# URBAN LEPROSY IN INDIA




- Rapid urbanization
- Opportunity or employment
- Constraints in residential space
- Overcrowding
- Lack of ventilation
- Inadequate nutrition .....

Courtesy: Dr. SV Gitte Jt. Director (PH)

# SPECIAL FEATURES OF LEPROSY

1. Non cultivable M leprae
Mouse Foot Pad inoculation
PCR: Traditional /RT-PCR

2. Lepra reactions
Type I: Reversal reaction
Type II: Erythema nodosum leprosum

**3. Stigma & Discrimination**
Myths
Discriminatory laws

4. Neglected tropical disease
Disabilities
Stigma & discrimination

5. Diagnosis & Treatment:
Clinical diagnosis
Long duration

6. Determination of viability**
16 S r-RNA , RLEP, sodA mRNA– (CT>39)
Fluor: RR assay ($10^7$), L/D BacLight ($10^6$)

# CLUSTERING IN LEPROSY

- Spatial clustering
  - Especially among MB cases[1]

- Household (family) clustering
  - PB contact: 2.1[2]
  - MB Contact: 3[2]

- Genetic clustering
  - Among brother/sisters (<20 yrs): >6.4[3]
  - Among brother/sisters (>20 yrs):2.9[3]
  - Among any sibling (TT leprosy): 2.21[4]

1. Martelli et. Al. Bull WHO 1995:73(3):315-19.
2. Wallace C. Lepr Rev 2003;74:133-40.
3. Bakker MK. BMC Medical Genetics 2005;**6**:40.
4. N Risch. Am J Hum Genet. 1987;40(1):1-14.

# DIAGNOSIS

1. Clinical diagnosis
RJ: TT, BT, BB, BL, LL
WHO: PB & MB Leprosy

2. Slit Skin Smear (Non cultivable bacilli)
Bacterial Index: < 2+ >
Morphological Index: Live bacilli

3. Pathological diagnosis (skin biopsy)*
TT:Nodular, histiocytic infilt$^r$, nerve dest$^r$
LL: Histiocytes (Virchow's), non-infiltration

4. Molecular diagnostic methods
PCR:(Target genes: pra-36 Kda/18 KDa, RLEP, Ag85B, 16S RNA, *folP*, *rpoB*, & *gyrA)*

5. Immunological methods.
M. leprae Ab specific to Ag:
PGL-1, LID-1, PADL etc.

6. Mouse Foot Pad Inoculation
Shepard (1960): Swiss albino, Balb-C
Viability, Drug resistance

# TREATMENT

| **ADULTS** >15 yrs | **CHILDREN** (10-15 yrs.) |
|---|---|
| **1. Regimen (PB Leprosy)**<br>R (600) Once a month supervised<br>D (100) Daily Unsupervised | **1. Regimen (PB Leprosy)**<br>R (450) Once a month supervised<br>D (50) Daily Unsupervised |
| **2. Regimen (MB Leprosy)**<br>R (600) Once a month supervised with C<br>D (100) Daily Unsupervised<br>C (300) Once a month + (50) daily | **2. Regimen (MB Leprosy)**<br>R (450) Once a month supervised with C<br>D (50) Daily Unsupervised<br>C (150) Once a month + (50) alternate day |
| **3. Duration**<br>PB Leprosy: 6 months<br>MB Leprosy: 12 months | **3. Duration**<br>PB Leprosy: 6 months<br>MB Leprosy: 12 months |

# EFFICACY OF VARIOUS TREATMENT REGIMENS IN LEPROSY

## 1. Complete clinical cure

Lazzo-porras et. al. BMC infectious diseases 2020;20:62.

| Study | Patients | Comparison | Follow up | RR | 95% CI | *p* value |
|---|---|---|---|---|---|---|
| Balagon, 2010 [18] | PB | MDT vs. 28 days of RFP + ofloxocin for 4w then 5 months of placebo | 6 m | 4.2 | 2.25–7.85 | < 0.05 |
| | | | 12 m | 0.93 | 0.80–1.09 | 0.38 |
| Bathe, 1986 [19] | | MDT vs. MDT+ clofazimine in alternative days for 6 m | 6 m | 1.25 | 0.77–2.04 | 0.37 |
| | | | 24 m | 1.09 | 0.93–1.27 | 0.29 |
| Orege, 1990 [26] | | MDT vs. Modified MDT (MDT + RFP + dapsone)[a] | 6 m | 0.76 | 0.61–0.95 | 0.02 |

## 1. 2. Clinical improvement

Lazzo-porras et. al. BMC infectious diseases 2020;20:62.

| Study | Patients | Comparison | Follow up | MDT | Control |
|---|---|---|---|---|---|
| Rao, 2009 [27] | PB | MDT vs RFP + dapsone + clofazimine (good) | 24 m | 6/11 (52%) | 7/9 (78%) |
| | | MDT vs RFP + dapsone + clofazimine (moderate) | | 3/11 (27%) | 2/9 (22%) |
| | MB | MDT vs RFP + dapsone + clofazimine (good) | | 13/17 (77%) | 1/4 (25%) |
| | | MDT vs RFP + dapsone + clofazimine (moderate) | | 3/17 (17%) | None |
| Sampoonachut, 1997 [36] | | MDT vs. MDT + ofloxacin. | 36 m | 66.70% | 73.30% |
| | | MDT vs. ofloxacin + clofazimine, then MDT | | 66.70% | 76.50% |
| Tejasvi, 2006 [39] | | MDT vs. RFP + Sparfloxacin + clarithromycin + minocycline | 12 m | 66.66% | 73.92% |
| Villahermosa, 2004 [40][b] | | MDT vs. ROM | 96 m | 22 points | 20 points |

# EFFICACY OF VARIOUS TREATMENT REGIMENS IN LEPROSY

## 3. Relapse

Lazzo-porras et. al. BMC infectious diseases 2020;20:62.

| Study | Patients | Comparison | Follow up | RR | 95% CI | $p$ value |
|---|---|---|---|---|---|---|
| Balagon, 2010 [18] | PB | MDT vs. 28 days of RFP + ofloxacin for 4w then 5 m of placebo | 12 m | 1.76 | 0.16–18.88 | 0.64 |
| Katoch, 1999 [22] | | MDT vs. MDT+ clofazimine | 24 m | 5 | 0.24–103.28 | 0.3 |
| Kumar, 2015 [23] | | MDT vs. ROM | 24 m | 0.5 | 0.05–5.45 | 0.57 |
| | | | 96 m | 1.7 | 0.94–3.07 | 0.08 |
| Manickam, 2012 [24] | | MDT vs. ROM | 6 m | 1.43 | 0.56–3.64 | 0.46 |
| Fajardo 2009 [30] | MB | MDT 2y vs. MDT 1y + 1 month daily RFP/ofloxacin | 144 m | 0.51 | 0.05–5.46 | 0.58 |
| | | MDT 2y vs. 1 month daily RFP/ofloxacin | | 0.11 | 0.02–0.87 | 0.04 |
| | | MDT 2y vs. MDT 1 y | | 0.05 | 0.01–0.37 | < 0.05 |
| Olivera Penna, 2017 [35] | | MDT vs. RFP+ dapsone + clofazimine × 6 m | 60 m | 0.16 | 0.02–1.29 | 0.08 |
| Souza Cunha, 2012 [38] | | MDT 1y vs. MDT x 2y | 84 m | 2.59 | 0.13–52.17 | 0.53 |
| | | MDT 1y vs. MDT + ofloxacin | | 1.04 | 0.15–7.10 | 0.97 |
| | | MDT 1y vs. ofloxacin + RFP | | 0.13 | 0.03–0.51 | < 0.05 |
| Villahermosa, 2004 [40] | | MDT vs. ROM | 96 m | No events reported | | |

BI

| Study | Patients | Comparison | Follow up | MD | 95% CI | $p$ value |
|---|---|---|---|---|---|---|
| Bathki, 1992 [29] | MB | MDT vs. MDT + vaccine | 24 m | 1.3 | 0.48, 2.12 | < 0.05 |
| Gunawan 2018 [32] | | MDT vs. CDC | 3 m | 0.03 | −0.03,0.09 | 0.75 |
| Jadav, 1992 [33] | | MDT vs. RFP + dapsone + clofazimine | 24 m | 0.41 | 0.12, 0.70 | < 0.05 |
| Olivera Penna, 2017 [35] | | MDT vs. RFP+ dapsone + clofazimine × 6 m | 60 m | − 0.15 | −1.06,0.76 | 0.34 |
| Sampoonachut, 1997[c] [36] | | MDT vs. MDT + ofloxacin. | 36 m | −0.07 | − 0.48, 0.34 | 0.74 |
| | | MDT vs. Ofloxacin + clofazimine, then MDT | | −0.68 | −1.10, − 0.26 | < 0.05 |
| Shaw, 2003[c] [37] | | MDT vs. RFP + clofazimine+ acedapsone + dapsone | 24 m | 0.1 | − 0.34, 0.54 | 0.66 |

# WHO RECOMMENDATIONS - 2018

1. **Diagnosis**
Clinical diagnosis with or without SSS/Skin biopsy*

2. **Treatment**
Three drugs Rmp, DDS, Clo: PB (6 months), MB (12 months)*

3. Chemoprophylaxis with SDR
SDR for contacts of leprosy patients Adults and Children >2 yrs age**

Conditional Recommendations (*Very low quality evidence, **Moderate quality evidence)

# DRUG RESISTANCE

1. Extent*
World: Overall (3.8%), Among New cases (2.0%), Among relapse (5.1%)
India: Overall (4.7%), Among New cases (4.2%), Among relapse (3.9%)

2. Diagnosis
MFP Inoculation: 103 per MFP →read 6-12-18 months
PCR: Genes- folP (dapsone), rpoB (Rifampicin), & gyrA (Ofloxacin)

3. Treatment* (If Rifampicin resistance)
Two (2nd line drugs) +Clo * 6 Months + One (2nd line drugs)+Clo * 18 months
IInd line drugs: Cla, Mino, Quino (Oflox, Moxi, Levo)

WHO Country report 2009-2015.

# PREVENTION

**1. Primary prevention:**
**Health promotion:**
Sanitation-Hygiene, cough etiquettes, Mask.

**1. Primary prevention:**
**Specific protection**
MIP (39%-68%[1]), BCG (26[2]-62[3]%)



**2. Secondary prevention:**
Early diagnosis & PEP among contacts

**2. Secondary prevention:**
Timely & complete treatment (MDT)

**3. Tertiary prevention**
Disability limitation: Physio, RCS

**3. Tertiary prevention**
Rehabilitation: Aids & Appliances

1. Sharma P. et al. (2005), 2.Setia et. al. (2006), 3.Zodpey et. al. (2005)

# TAKE HOME MESSAGE

1. Leprosy discovered since >150 years.
Significant progress achieved in its elimination.

2. India bears highest burden in the world
Cases (69.1%), Children(65.2%), G2D( 42.4%)

3. Highly infective but low pathogenic
M. leprae: Obligate intracellular AF Bacilli
Incubation period(3-5 yrs),Droplet transmission,

4. Risk factors & Special features
Age, overcrowding, ↓ventilation, ↓ Immunity,
Contact with PAL, Clustering, Reactions

5. Diagnosis:
Clinical, SSS, Pathological- Molecular &
Immunological methods, Viability, MFP

6. Treatment, prevention & Control
MDT, Vaccines, PEP, DPMR- Physio, RCS,
MCR.


C.L.T.&R.I.
CHENGALPATTU
ADMINISTRATIVE BLOCK

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... thank you